

City of Big Bear Lake  
Department of Water and Power

**2005 Urban Water Management Plan**

February 2006

*Draft*



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# Section 1

## Introduction

### 1.1 Overview

The City of Big Bear Lake Department of Water and Power (DWP) is organized and operated pursuant to the California Water Code. DWP is governed by a five-member Board of Commissioners (Board) that is appointed by the City of Big Bear Lake City Council. The DWP serves the area known as City of Big Bear Lake, and the communities of Fawnskin, Erwin Lake, Lake William, Rim Forest, Sugarloaf, and Moonridge in unincorporated San Bernardino County. Currently, the sole source of supply for the DWP in the Big Bear Valley is local groundwater.

As an urban water supplier providing municipal water to more than 3,000 customers, the DWP is required to comply with The Urban Water Management Planning Act (Act). The Act became effective on January 1, 1984 and requires that urban water suppliers prepare and adopt an urban water management plan, in accordance with prescribed requirements.

The Act was originally developed as a result of concerns for potential water supply shortages throughout the State. Therefore, it required information that focused primarily on water supply reliability and water use efficiency measures. Since its original passage in 1983, there have been several amendments added, the most recent adopted in 2004. Some of the recent amendments include: providing additional emphasis on drought contingency planning and recycled water, as well as incorporation of water quality issues and how they might affect water supply reliability.

With the passage of Senate Bills 610 and 221, in 2001, Urban Water Management Plans (UWMP) take on even more importance. SB 610 and 221 require that counties and cities consider the availability of adequate water supplies for certain new large developments. These statutes require written verification of sufficient water supply to serve the new development, and Urban Water Management Plans are identified as key source documents for this verification. Based on the history of development in the DWP service area, it is unlikely that either of the statutes established by the Senate bills will ever apply to the DWP.

The 2005 UWMP updates the 2000 UWMP and takes into account new Act requirements and changes in demographics. Like much of arid-west Southern California, DWP faces increasing water demands, limited water supplies, and water quality challenges.

### 1.1.1 History

The Big Bear Valley was settled in the 1860's following the discovery of gold in the area. In 1884, Big Bear Lake was formed with the construction of a dam to provide irrigation waters to the San Bernardino Valley. By the 1920's recreation was the most important economic factor in the valley. In 1977, the Big Bear Municipal Water District assumed control of the lake, altering its primary purpose from irrigation to water recreation. The City of Big Bear Lake was incorporated in 1980 and became a charter city in 1983. The City of Big Bear Lake Department of Water and Power was formed in 1989 with the purchase of the water system from Southern California Water Company.

### 1.1.2 Service Area Description

#### Land Use

The DWP's service area encompasses approximately 5,970 acres, or 9.3 square miles located in the Big Bear Valley, and the Rim Forest Area located south of Lake Arrowhead (Figure 1-1). The service area is located in the San Bernardino Mountains in San Bernardino County. Land surface elevations range from 6,000 ft to 9,900 ft. The elevation of Big Bear Lake itself is 6,740 ft. The main service area is comprised of the Big Bear Lake / Moonridge system mostly located in the City of Big Bear Lake, and the Sugarloaf / Erwin Lake system located in San Bernardino County. There are also 3 smaller, isolated service areas, Fawnskin, and Lake William systems located in Big Bear Valley, and Rim Forest, all within unincorporated San Bernardino County. Single Family Residential occupies 85% of the acreage, commercial 12%, government and institutional 2.5%, and industrial 0.5%.

#### Demographics

Current demographics were obtained from a variety of sources, including the California Department of Finance, U.S. Census Bureau, and City and County planning documents. Table 1-1 presents these demographics in five year intervals beginning in 2005 and ending in 2025. The data is for the Big Bear Valley area which includes those areas served by the DWP.

<b>Table 1-1</b>					
<b>Population – Current and Projected</b>					
	2005	2010	2015	2020	2025
Big Bear Valley Population	19,905	23,075	26,750	31,000	35,950

Within DWP's service area, population is expected to grow slowly over the next 20 years. The estimated rate of population growth ranges from 1.0% to 3.0% per year, based on growth since 2000. The average annual rate of population growth during the 1990's was 0.7% per year; growth has increased since 2000. The US Census Bureau estimated a growth rate of 3.0% for the City of Big Bear Lake, which is anticipated to be higher than that of the rest of Big Bear Valley. However, apparently due to the large number of part time homeowners and the recreational character of the area, there is probably no population estimate that could be described as definitive. For purposes of this UWMP, a conservative average annual population growth rate of 3.0% per year was assumed.

The DWP service area is primarily a mountain / resort community. Therefore, the population consists of a mixture of full-time and part-time residents, vacationers, and short-term visitors. The City of Big Bear Lake Chamber of Commerce estimates that the population of the Big Bear Valley can peak at 80,000 to 100,000 people on weekends and holidays, year round. The Census Bureau estimates that 75% of the homes in the DWP service area are what is considered "vacant," which means that they are either vacation homes or second homes, and that 25% of the homes are occupied full time. DWP records suggest that approximately 1/3 of its customers are full time residents.

## Climate

The tables below (Table 1-2, 1-3) summarize the standard monthly ETO in the Big Bear Valley, along with average rainfall and average temperature, on a monthly basis.

<b>Table 1-2 ETO, Average Rainfall, Average Temperature by Month</b>						
	Jan	Feb	Mar	Apr	May	June
Standard Monthly ETo	2.08	1.95	3.96	4.62	6.30	7.01
Average Rainfall (inches)	4.04	4.11	3.29	1.32	0.51	0.13
Average Temperature (F)	34	35	38	43	51	58

<b>Table 1-3 ETO, Average Rainfall, Average Temperature by Month</b>							
	July	Aug	Sept	Oct	Nov	Dec	Annual
Standard Monthly ETo	6.77	5.72	5.28	3.76	2.19	1.92	51.56
Average Rainfall (inches)	0.71	1.05	0.55	0.80	2.17	2.97	21.65
Average Temperature (F)	64	63	57	49	40	34	47

(above information from Bill LaHaye, DWP)

## 1.2 Water Master Plan

To help achieve its desire to have adequate water supplies for the future, the DWP is in the process of completing a Water Master Plan (WMP). The purpose of the WMP is to develop a long-range water supply and capital improvement plan to reliably meet the needs of the DWP service area for the future.

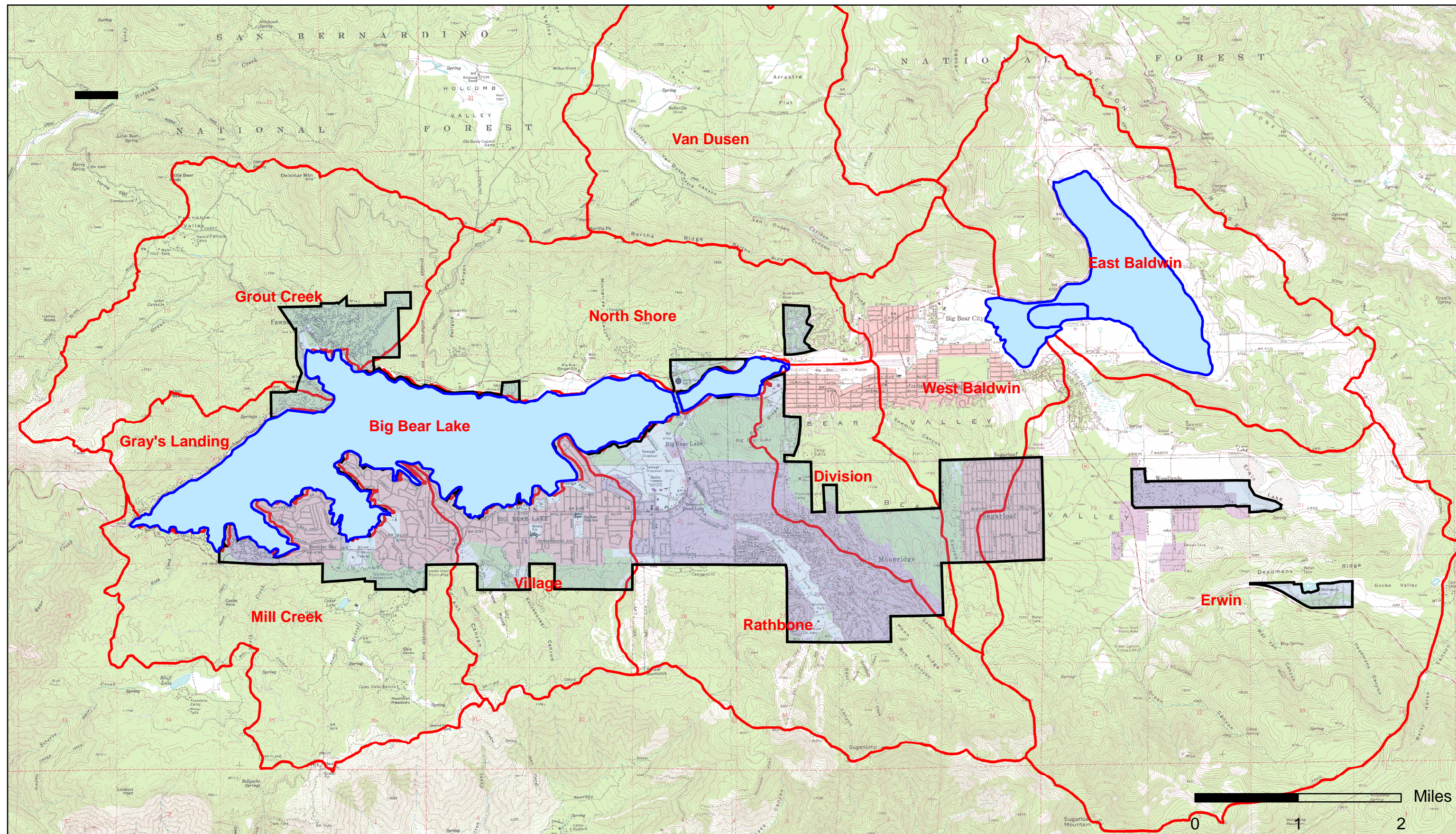
The WMP is an assessment of current and ultimate water demands, evaluation of available groundwater supply sources to meet projected demands, and an evaluation of the distribution system to convey the source water through the service area. As a part of the assessment of the distribution system, a hydraulic model is being developed and calibrated to estimate the needed capacities of pipelines, storage facilities, and pumping units. In addition, the WMP includes a financial plan and rate study, which will allow the DWP to determine the proper rate structure needed to meet the financial goals and capital improvements outlined in the WMP.

## 1.3 Agency Coordination

The DWP shares the Big Bear Valley with one other water supplier, the Big Bear City Community Services District (BBCCSD), which serves unincorporated Big Bear City and a portion of Erwin Lake. DWP also receives wholesale water from the Crestline Lake Arrowhead Water Agency for delivery to the Rim Forest portion of the service area. Other water management agencies the DWP must coordinate with include the Big Bear Lake Municipal Water District (BBLMWD) which manages Big Bear Lake, Big Bear Area Regional Wastewater Agency (BBARWA) which provides wastewater management for the Big Bear Valley, and San Bernardino County, County Service Area 53B (CSA 53B), who provides wastewater service to the Fawnskin area.

Table 1-4 Agency Coordination							
	Participated in UWMP development	Comment on the draft	Attended Public meetings	Contacted for assistance	Received copy of the draft	Sent notice of intention to adopt	Not Involved / No Info
<i>Other water suppliers:</i>							
CLAWA			X	X	X	X	
BBCCSD			X	X	X	X	
<i>Water Management Agencies:</i>							
BBLMWD				X			
BBARWA		X	X	X	X	X	
CSA 53B (Fawnskin sewer)					X	X	
<i>Relevant Public Agencies:</i>							
City of Big Bear Lake	X	X	X	X	X	X	
County of San Bernardino	X		X	X	X	X	





# Legend

- DWP Service Area
- Groundwater Subunits

## City of Big Bear Lake Department of Water and Power Service Area and Goundwater Subunits



# Section 2

## Water Supply Sources

### 2.1 Current Water Supply Sources

The City of Big Bear Lake Department of Water and Power (DWP) current water supplies include local ground water for the Big Bear Valley portion, and imported water from the Crestline Lake Arrowhead Water Agency (CLAWA) for Rim Forest. Groundwater accounts for 98-99% of the water supply, with imported water from CLAWA accounting for 1-2% of the water supply.

DWP's existing water supply and distribution system consists of the following:

- approximately 176 miles of water pipeline,
- 32 active vertical wells
- 23 slant wells, with supply flowing into the system by gravity
- 16 storage reservoirs, which provide storage for domestic and fire flow,
- 12 booster pump stations, which transfer water to upper pressure zones,
- 23 chlorination stations,
- 22 sample stations.

The existing water supply operates between the elevations of 5,620 feet and 7,460 feet.

<b>Table 2-1</b> <b>Current and Planned Water Supplies 2005-2025</b>					
<b>Water Supply Sources</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Wholesale Provider – Crestline Lake Arrowhead Water Agency	66	66	66	66	66
Supplier Produced Groundwater	2,450	2,817	2,152	2,475	2,797
Transfers In/Out	25	0	0	0	0
Exchanges In/Out	0	0	0	0	0
Recycled Water	11	11	1,000	1,000	1,000
<b>Total Supply</b>	<b>2,552</b>	<b>2,894</b>	<b>3,218</b>	<b>3,541</b>	<b>3,863</b>

The supplier produced groundwater figure shown above (Table 2-1) is the total quantity of groundwater produced in three of the four DWP's system areas, as needed to meet demand. It is assumed that only the required amount of groundwater to meet demand will be pumped, resulting in lower amounts of groundwater produced in future years when recycled water becomes available. The quantities presented in this table represent the anticipated quantities needed from each source in the indicated year.

The DWP system consists of 5 separate service areas; Fawnskin, Rim Forest, Lake William, Erwin Lake/Sugarloaf and the City of Big Bear Lake / Moonridge systems. Of those five service areas, the Rim Forest service area is supplied by the Crestline Lake Arrowhead Water Agency. The Rim Forest service area is separate and distant from the rest of the DWP's service areas. It is assumed for purposes of this UWMP that due to the lack of available vacant lots in the Rim Forest area, that there will be no future growth in the area. Therefore the quantity of imported water from CLAWA for the Rim Forest service area will remain consistent through 2025.

For the recycled water component, it was assumed that the Recycled Water Master Plan, described in Section 5, is implemented as written, with Phase 1 completed by 2010, with the first deliveries of 500 acre-feet of recycled water to the groundwater recharge site, beginning in 2011. The second phase of the Recycled Water Plan is assumed to be completed in 2014, with an additional 500 acre-feet of recycled water delivered to the groundwater recharge site beginning in 2015, for a total of 1,000 acre-feet of recycled water.

### **2.1.1 Groundwater**

DWP extracts groundwater from 55 wells in state-licensed water systems throughout the Big Bear Valley area. Two systems, the Big Bear Lake/Moonridge water system and the Fawnskin water system, are located in the Big Bear Lake Watershed, and have individual water supply facilities; they are not physically connected to each other. The three remaining systems are the Rim Forest water system and the Erwin Lake/Sugarloaf and Lake William water systems, located in the unincorporated area of the County of San Bernardino. The Rim Forest water system is also located physically distant from the rest of the DWP system and is not physically connected to them. The water supply for Rim Forest is provided by imported water from the Crestline Lake Arrowhead Water Agency.

Each of these water systems contains at least one ground water subunit. The following water systems are supplied primarily from the following subunits:



- Big Bear Lake/Moonridge water system
  - Mill Creek subunit
  - Village subunit
  - Rathbone subunit
  - Division subunit
- Lake William water system
  - Erwin subunit
- Fawnskin water system
  - Grout Creek subunit
  - North Shore subunit
- Erwin Lake / Sugarloaf water system
  - West Baldwin subunit
  - Erwin subunit

The so called Big 4 service area, which includes City of Big Bear Lake / Moonridge, and Sugarloaf / Erwin Lake portions of the valley consists of twelve pressure zones and accounts for nearly 90% of the total land area served by the DWP. Elevations in this service area range from 6,750 feet and 7,460 feet above mean sea level.

The Fawnskin service area consists of two pressure zones with elevations ranging from 6,740 feet and 7,080 feet above mean sea level. This service area covers about 0.7 square miles of area.

The Lake William service area consists of one pressure zone with elevations ranging from 7,100 feet to 7,300 feet above mean sea level. This service area covers an area of about 0.18 square miles.

Table 2-2 outlines the current and planned water supplies through 2025. The quantities presented in this table represent the anticipated quantities needed from each source in the indicated year.

<b>Table 2-2 Current and Planned Water Supplies – AF/Y</b>					
<b>Water Supply Sources</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Supplier Produced Groundwater	2,450	2,817	2,152	2,475	2,797
Transfers In / Out	25	0	0	0	0
Exchanges In / Out					
Recycled Water (Current and Projected)	11	11	1000	1000	1000

### 2.1.1.1 Historic Pumping

Historic total groundwater pumped by DWP from 2000 through 2005 is presented in Table 2-3 below. Average yearly production for the period was 2,738 acre-feet per year. However, as a result of a stringent tiered rate structure and efficient water use campaign current (2005) water use is significantly less than average. Throughout this period, groundwater accounted for 98-99% of the total DWP supply.

<b>Table 2-3 Amount of Groundwater Pumped – AF/year</b>						
<b>Subunit (Basin) Name</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Village	297.8	285.1	354.1	252.8	273.6	268.6
Rathbone	1,319.7	1,156.7	1011.9	944.8	840.2	967.6
Division	386.0	496.7	403.0	331.1	357.0	342.2
Erwin	515.9	529.7	615.1	614.6	716	542.8
North Shore	310.3	380.6	361.1	315.5	310.6	220.9
Grout Creek	127.0	126.0	124.8	116.9	104.1	108.49
Gray's Landing	0	0	0	0	0	0
Mill Creek	0	0	0	0	0	0
Totals	2,956.7	2,974.8	2,870	2,575.7	2,601.5	2,450.6
% of total water supply*	98%	98%	98%	98%	98%	98%

\* remaining 2% is imported water to Rim Forest

None of the groundwater basins in the DWP service area are adjudicated. At present, the Village subunit is in overdraft. Pumping in the Village subunit will be decreased in future years in hopes of allowing the subunit to recover.

The amount of groundwater projected to be pumped is presented below in Table 2-4. Starting in 2015, when the Recycled Water Plan is expected to be fully implemented and delivering 1000 acre-feet per year, groundwater will represent about 70% of the DWP supply.

<b>Table 2-4</b>				
<b>Amount of Groundwater projected to be pumped – AF/Y</b>				
<b>Subunit (Basin) Name</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Village	269	145	172	200
Rathbone	1,095	840	935	1031
Division	396	303	338	373
Erwin	644	494	551	607
North Shore	340	261	291	320
Grout Creek	122	125	128	130
Gray's Landing	0	0	0	0
Mill Creek	50	100	100	100
<b>Totals</b>	<b>2,916</b>	<b>2,268</b>	<b>2,515</b>	<b>2,761</b>
<b>% of total water supply</b>	<b>98%</b>	<b>69%</b>	<b>72%</b>	<b>74%</b>

## 2.1.2 Recycled Water

Currently, the DWP does not use recycled water within its service area. The Big Bear Area Regional Wastewater Agency (BBARWA) does supply some recycled water to 139 customers, but this water is not provided to the customers by the DWP, but rather directly from BBARWA's treatment plant. Wastewater is presently treated at the BBARWA treatment plant, and then conveyed to a 480 acre site in the Lucerne Valley where it is used to irrigate alfalfa fields.

As discussed in Section 5, Recycled Water Master Plan, BBARWA, consulting with DWP, has prepared a Recycled Water Master Plan. This Plan outlines proposed uses for recycled water within the Big Bear Valley, including groundwater recharge, and landscape irrigation. It is anticipated that this Plan will be implemented such that the first deliveries of recycled water will occur in 2011. Recycled water use is discussed in further detail in Section 5 of this UWMP.

## 2.1.3 Water Transfers

### 2.1.3.1 Water Code section 10631

Describe the opportunities for exchanges or transfers of water on a short term (less than one year) or long-term basis.

The Big Bear Valley is located in the San Bernardino Mountains in the Transverse Ranges of Southern California. Land surface elevations in the area range from approximately 6,000 to 9,900 feet above mean sea level, with Big Bear Lake itself at 6,740 feet amsl. The immediate areas outside the valley are generally at the base of the mountain ranges, at elevations between 1,000 – 2,500 feet amsl. Given the large change in elevation between the Big Bear Valley and the surrounding areas, transfers or exchanges via import from outside the mountain areas would be extremely costly and technically difficult. However, there is an opportunity for the transfer or exchange of water, as discussed below (Table 2-5).

Table 2-5 Transfer and Exchange Opportunities – AF/Y (Table 2-5)					
Source Transfer Agency	Transfer or Exchange	Short Term	Proposed Quantities	Long Term	Proposed Quantities
Big Bear City Community Services District	Both	Yes	Unknown	Yes	Unknown

### 2.1.3.2 Big Bear City Community Services District (CSD)

The Big Bear City CSD is the water supplier for a portion of the Big Bear Valley, providing water to the unincorporated portions of Big Bear City and the eastern portion of the valley. Through two emergency supply interconnections between the CSD and DWP systems, the most recent installed in 1996, transfers are possible between the two purveyors. These interconnections are for emergencies such as natural or man-made disasters that would disrupt or damage the DWP's or the CSD's ability to continue to serve the public. In addition, transfers and exchanges generally occur as a water saving measure. When either agency needs to do system repair and maintenance, they will transfer the excess water rather than discharge it to the environment. The interconnections are intended to be used until either agency declares its use no longer necessary.

There are no set agreements between the CSD and DWP for limits on the quantity of water that could be transferred. Each transfer is evaluated on a case by case basis, but in no way would be allowed to affect the transferring agencies ability to supply their own customers needs.

### 2.1.3.3 Crestline Lake Arrowhead Water Agency (CLAWA)

The Crestline Lake Arrowhead Water Agency is the water supplier for the Crestline, Lake Arrowhead, and Rim Forest portion of the San Bernardino Mountains. Lake Arrowhead is located in the San Bernardino Mountains, west of Big Bear Lake and at an elevation of approximately 5100 feet amsl. CLAWA is presently the wholesale provider to the Rim Forest portion of the DWP service area, providing approximately 66 acre feet of water per year.

CLAWA does have some excess capacity that could be transferred to the DWP, but there is presently no mechanism to transfer the water. The closest CLAWA transmission line to the DWP is approximately 12 miles away, following the state highway linking the two areas. Transfers or exchanges with CLAWA would be cost prohibitive at this time, and at any time in the foreseeable future.

#### 2.1.3.4 State Water Project – Morongo Pipeline

The Morongo Pipeline, carrying state water, is located approximately 25 miles from the Big Bear Valley. A pipeline could be constructed, at considerable cost, to the Morongo Pipeline from the DWP to provide an extra source of water, or opportunities for transfers and exchanges. While it is possible, it is unlikely that water could be obtained from this source, due to the large elevation difference, approximately 5,000 feet, the large distance from the existing pipeline, approximately 25 miles, and a variety of governmental obstacles.

#### 2.1.3.5 Big Bear Lake Municipal Water District

The main feature of the Big Bear Valley is Big Bear Lake itself. This lake was created in 1884 by damming Bear Creek with Bear Valley Dam. The lake bottom, Bear Valley Dam and the right to manage the lake surface is owned by Big Bear Municipal Water District. The water rights to the lake water itself are owned by Bear Valley Mutual Water Company. At this time, there is no agreement that would allow diverting lake water for DWP use. It is unlikely that such an agreement would be possible at this point in time.

## 2.2 Planned Water Supply Sources

DWP is currently in the process of preparing a Water Master Plan. The purpose of the Water Master Plan is to develop a long-range water supply plan and capital improvement plan that reliably meets the needs of DWP's service area from now until 2035. Data derived from the Water Master Plan to analyze DWP's future demand and supply is discussed further in Section 7.

Table 2-6 summarizes the hydrologic years used to assess the supply reliability for the 2005 UWMP. The Big Bear Valley contains a large rain shadow, which drastically affects the quantity of rainfall received throughout the Valley. Rainfall totals at the Big Bear Dam, located at the west end of the Valley, can be 4-5 times higher than the totals at Baldwin Lake, located at the east end of the Valley. The hydrologic years used in the table were selected based on local weather, hydrology, and the availability of supply information from the DWP. Rainfall data was available back to the year 1884 for the Big Bear Dam weather station, but only back to the year 1950 for the CSD weather station.

<b>Table 2-6 Basis of Water Year Data</b>		
<b>Water Year Type</b>	<b>Base Year(s)</b>	<b>Historic Sequence</b>
Normal Water Year	1982	1884-2004
Single-Dry Water Year	2002	1884-2004
Multiple-Dry Water Years	2001-2003	1884-2004

The current and planned water supplies out to the year 2025 are in Table 2-7. This table assumes that the Recycled Water Master Plan is implemented and Stage 1 is completed by 2010, and Stage 2 is completed by 2014. Per the Recycled Water Master Plan, Stage 1 is projected to provide 500 AF per year of recycled water, while Stage 2 is projected to provide an additional 500 AF per year for a total of 1,000 AF per year starting in 2015. See Section 5 for more information on the Recycled Water Master Plan.

<b>Table 2-7 Current and Projected Water Supplies (AF/Y)</b>					
<b>Water Supply Sources</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Wholesale Provider – Crestline Lake Arrowhead Water Agency	66	66	66	66	66
Supplier Produced Groundwater	2,450	2,817	2,152	2,475	2,797
Transfers In/Out	25	0	0	0	0
Exchanges In/Out	0	0	0	0	0
Recycled Water	11	11	1,000	1,000	1,000
<b>Total Supply</b>	<b>2,552</b>	<b>2,894</b>	<b>3,218</b>	<b>3,541</b>	<b>3,863</b>

## 2.3 Future Water Supply Sources

Future water supply sources include recycled water, exchanges and transfers. As discussed in Sections 2.3.2 and 2.3.3, transfers and exchanges are not viable water supply sources for the DWP. Recycled water, as discussed in Section 2.3.1, and Section 6, is the most viable future source of water for the DWP. It is anticipated that the recycled water program will begin deliveries of recycled water in 2011. Table 2-8 summarizes the timing of new projected recycled water supplies, as well as the reliability of this supply under different water year types. The availability of recycled water is not anticipated to be affected by drought, because the average annual amount of recycled water represents less than half the average annual amount of wastewater treated at the plant.

<b>Table 2-8 Future Water Supply Projects</b>						
<b>Project Name</b>	<b>Project Start</b>	<b>Normal Year – AF to agency</b>	<b>Single Dry Year – AF to agency</b>	<b>Multiple Dry Years – AF to agency</b>		
				<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Recycled Water Master Plan <b>Stage 1</b>	2011	500	500	500	500	500
Recycled Water Master Plan <b>Stage 2</b>	2015	500	500	500	500	500
<b>Total</b>		1000	1000	1000	1000	1000

### **2.3.1 Future Recycled Water**

The DWP continues to explore opportunities to economically and feasibly utilize recycled water. As a result of the BBARWA's Recycled Water Master Plan, to which the DWP provided advisory and review capacity, BBARWA and the DWP estimate that in the future it will be able to potentially recycle 2,100 AFY of water for use within its service area. This amount could replace future potable water demands if implemented. Future recycled water supplies are discussed in more detail in Section 6.

### **2.3.2 Future Water Exchanges and Transfers**

As discussed above, the DWP has the ability to transfer water between the CSD and the DWP on an as required basis. Exchanges in the past have only occurred as an effort to save water when one agency, needing to do repairs and maintenance, transfers the excess water to the other agency rather than discharge to the ground. These exchanges do not occur regularly or with any predictable frequency, therefore, exchanges are not taken into consideration when examining future water supplies. The quantity of future exchanges is also impossible to quantify.

### **2.3.3 Desalination**

The Big Bear Lake area, and the service area of the Big Bear Lake Department of Water and Power, is located approximately 70 miles from the Pacific Ocean. Therefore, the development of desalinated water as a source of the supply for the Big Bear Lake DWP is not viable. Desalination of brackish groundwater is not necessary, given the water quality of the basins used by the DWP.

## **2.4 Demand Management Measures**

### **2.4.1 Introduction**

Increasing urban water conservation can provide additional water supply by permanently reducing demands. Effective water conservation practices are necessary to be able to provide adequate supplies to meet growing demands in the DWP service area. Through its own initiative, and its membership in the California Urban Water Conservation Council (CUWCC), the DWP is increasing water use efficiency within its service area.

The DWP is a recent signatory to the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) developed by the members of the CUWCC. As a signatory to the MOU, DWP is obligated to implement a set of 14 water conservation Best Management Practices (BMPs), also commonly referred to as Demand Management Measures (DMMs). The MOU established the CUWCC in 1991 to monitor and maintain the BMPs. Biennially member agencies are required to submit a report to CUWCC detailing progress towards the implementation of the 14 BMPs. Participation and compliance with the BMPs is monitored by CUWCC which offers guidelines on the implementation and assessment of the BMPs.

## 2.4.2 BMP Implementation

The MOU commits DWP and other signatories to develop comprehensive, economically feasible conservation programs and to consider water conservation as a viable water management option through the implementation of BMPs. BMPs are defined in the MOU as:

- An established and generally accepted practice among water suppliers that result in more efficient use or conservation of water.
- A practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out.

The DWP is obligated to implement all of the BMPs, except BMP 10, which pertains to wholesale agencies only (Table 2-9).

<b>Table 2-9 BMP Implementation</b>		
<b>BMP (DMM) #</b>	<b>Practices</b>	<b>Status</b>
1	Water survey programs for single-family residential and multi-family residential customers	Implemented
2	Residential plumbing retrofit	Implemented
3	System water audits, leak detection and repair	Implemented
4	Metering with commodity rates for all new connections, and retrofit of existing connections	Implemented
5	Large landscape conservation programs and incentives	Implemented
6	High efficiency washing machine rebate program	Not Implemented
7	Public Information Programs	Implemented
8	School Education Programs	Implemented
9	Commercial/Industrial/Institutional water conservation	Implemented
10	Wholesale agency assistance program	Not Applicable
11	Conservation Pricing	Implemented
12	Water conservation coordinator	Implemented
13	Water waste prohibition	Implemented
14	Residential ULFT replacement program	Implemented

As part of the Urban Water Management Plan, Big Bear Lake DWP is required to provide a description of their BMPs that are currently being implemented or are scheduled to be implemented.



The Big Bear Valley has experienced a six year drought, with substantially less than normal rainfall during that period. In December 2002, the Board of Commissioners declared a water shortage emergency. In order to maximize the use of existing water supplies and prevent wasteful or inefficient consumption of water within the Valley, the DWP recently implemented several additional ordinances and measures that address these issues.

### **2.4.3 BMP 1: Water Survey Programs for Single-Family and Multi-Family Residential Customers**

The DWP is currently conducting targeted and untargeted residential surveys at no cost to the customer. The DWP contacts and conducts targeted water surveys on the top residential users in the system, with a goal of contacting the top 20% of users. Untargeted surveys include customer requests, and those generated as a result of the Retrofit on Change or Service program. These system surveys are a cost effective means of getting customers to participate in the DWP's community water-use efficiency campaign.

As part of these surveys, the DWP checks the landscaping, irrigation systems, and indoor plumbing fixtures to make recommendations for improving the customer's water-use efficiency. If field personnel notice leaks or unusually high water consumption, they will leave a door tag alerting the customer to check for leaks. In addition, field personnel will also look for landscape ordinance and water shortage ordinance violations, and issue a door tag if a violation is observed.

Determining the actual water savings from water surveys is difficult. While there are obvious savings from eliminating leaks, and improving water-use efficiency, these amounts are difficult to separate from savings from other measures. In addition, the DWP has not kept records of the recommendations and improvements made during these surveys. The actual expenditures to conduct the residential surveys are estimated based on the number of surveys and the time required to perform each survey. CUWCC's methodology for calculating water savings resulting from indoor water surveys assumes savings from showerhead retrofits, ULFT retrofits, and leak repairs. It is not reasonable to assume each survey will result in all or any of these changes. It should be noted that this methodology introduces double counting of toilet and showerhead retrofits because these fixtures are offered as part of separate BMPs (BMPs 2 and 14).

The goal of the DWP residential survey program is to perform a minimum of 200 surveys a year, focusing on the top residential water users. The CUWCC guideline for implementation of BMP 1 is 15% of the single-family and 15% of the multi-family units to receive water use surveys within 10 years of implementation. Based on these guidelines, the DWP would need to conduct approximately 200 single-family and approximately 20 multi-family surveys per year for the next 10 years.

Based on an estimated cost of \$50 per residential survey, and an estimated 21 gpd per household water savings (DWP estimates), the estimated cost per acre-foot of the first year's water savings is \$2,200 (Tables 2-10 and 2-11).

<b>Table 2-10 Past Residential Water Use Surveys</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
# of single family surveys (a)	0	25*	40*	75*	315
# of multifamily surveys	NA	NA	NA	NA	NA
Actual Expenditures - \$	0	\$1,250	\$2,000	\$3,750	\$15,750
Actual Water Savings – AF/Y (b)	0	0.59	0.94	1.76	7.4

<b>Table 2-11 Projected Residential Water Use Surveys</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of single family surveys (a)	295	265	220	180	180
# of multifamily surveys	20	20	20	20	20
Anticipated Expenditures - \$	\$15,750	\$14,500	\$12,500	\$11,000	\$11,000
Anticipated Water Savings – AF/Y (b)	7.4	6.7	5.6	4.7	4.7

\* estimated # of surveys performed based on actual costs.

(a) Approximately 105 residential surveys were completed from 8/05 through 12/05, when the DWP began tracking surveys. Based on this information, an annualized estimate for 2005 would be 315. Since the survey are currently being driven by the turnover in the real estate market combined with the DWP's Retrofit on Change in Service Program, we would expect this annual rate of surveys to continue through 2006, with annual declines thereafter.

(b) Water savings shown are for the first year only, and not carried through to following years. The actual water savings will be greater as the savings accumulate over the years.

## 2.4.4 BMP 2: Residential Plumbing Retrofit

### 2.4.4.1 Retrofits Performed

The exact number of homes constructed prior to 1992 is not known. For the purposes of this BMP, the number of homes built prior to 1992 will be estimated by using the number of accounts in 1991. In 1991, it is estimated that there were 13,000 single family residential units, and 420 multi-family residential units in the DWP service area. Homes and businesses built after 1992 are assumed to have low flow plumbing fixtures installed already. To obtain 75% saturation of single family residences retrofitted, which is the saturation requirement of the BMP, 9,750 homes will need retrofitting. For multi-family residences, 315 will need retrofitting, to reach the 75% saturation requirement. The goal of the DWP is to reach 75% saturation of single and multi family residences, a total of approximately 10,000 retrofits, by 2015. Assuming 2 bathrooms per residence, 20,000 showerheads and conservation kits will need to be distributed.

To date, the DWP has distributed approximately 13,800 showerheads and water conservation kits, reaching a saturation point of approximately 69% of the total single and multi-family residences (Table 2-12 and 2-13). This was determined by comparing the number of low flow devices distributed to single and multi-family residences by the DWP to the number of accounts prior to 1992. In the past, records on single and multi-family distributions were not kept, just the total cost of the devices.

Water savings based on the retrofit of low flow showerheads, faucet aerators, and toilet displacement devices was estimated by the CUWCC to be 5.5 gallons per day (gpd), 1.5 gpd, and 4 gpd respectively. All three devices are generally distributed concurrently, so for the purposes of this BMP, the total estimated water savings is based on the cumulative savings of all three devices, or 11 gallons per day. A probability of installation of 50 percent, per the CUWCC, was used as well as an average lifespan of 2 years.

<b>Table 2-12 Actual Low Flow Device Distribution</b>					
	<b>1992-</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005 *</b>
# of Residential devices	3,475	4,400	4,400	1,270	340
Actual expenditures - \$	\$8,140	\$10,327	\$10,307	\$2,971	\$796
Estimated water savings – AF/Y **	42.8	54.2	54.2	15.6	4.2

\* 2005 data through June 2005

\*\* Estimated water savings through lifetime of devices

<b>Table 2-13 Projected Low Flow Device Distribution</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of single family devices	1,050	1,050	1,050	1,150	1,150
# of multi-family devices	200	200	200	100	100
Planned expenditures - \$	\$2,950	\$2,950	\$2,950	\$2,950	\$2,950
Planned water savings – AF/Y **	15.4	15.4	15.4	15.4	15.4

\*\* Estimated water savings through lifetime of devices

From the calculated water savings estimate, and the cost per device distributed and retrofitted, the average cost per acre-foot of water savings is \$190. This cost is roughly in line with the cost per acre-foot for toilet retrofits (\$106 retrofits, \$335 direct install) and significantly less expensive than other BMPs, such as water survey programs (\$2,200) and High efficiency washing machines (\$1,185).

#### 2.4.4.2 Retrofit Ordinances

There are several enforceable ordinances in effect requiring replacement of high-flow showerheads, faucets, and toilets with their low flow counterparts. The first is a “Retrofit upon Change in Service” resolution requiring all properties to retrofit to low flow fixtures and toilets upon change of service. In addition, the DWP has in place a Water Offset Demand ordinance, which requires new developments to offset their incremental estimated water demand as a result of the development. All developers

are required to pay a water demand offset charge with which the DWP will designate for retrofit projects that create water capacity.

***“Retrofit Upon Change in Service”***

The DWP instituted a Retrofit upon Change in Service ordinance, Resolution No. DWP 2005-03, in February 2005. The ordinance requires all existing structures to upgrade to low flow fixtures upon change in service.

*The Resolution states, “All existing structures, upon requests for change in service, shall be retrofitted with low flow faucets, showerheads, and toilets, as a prerequisite for continued service. All three items must have flow rates or gallons per flush that are 2.0 gallons per minute/flush or less. The property owner shall file with the DWP a written certification, signed under penalty of perjury, confirming that all faucets, showerheads, and toilets have been retrofitted as set forth herein.”*

Based on this ordinance, all property owners, whether residential or commercial, are required to retrofit the property with low flow fixtures as a condition of continued service.

***“Water Demand Offset Program”***

In February, 2005, a Water Demand Offset Program was passed, approved and adopted by the Board of Commissioners of the DWP, and the City Council of the City of Big Bear Lake. This program, now part of the Big Bear Lake Municipal Code, Chapter 13.26, requires developers to offset the water demand of their future developments with water savings or conservation elsewhere in the DWP system. This could be accomplished via retrofits, or the payment of an offset capacity charge. These monies are used by the DWP to offset the demand elsewhere in the system. Since the implementation of this program, the DWP has used the proceeds to fund showerhead, faucet aerator, and Ultra Low Flow Toilet retrofits.

In addition to the above ordinances, the DWP has distributed low flow showerheads and faucet aerators to all customers upon request. A water conservation kit, which included a showerhead, faucet aerator, toilet water displacement kit, and water conservation literature and brochures, are also distributed to customers upon request. The availability of the showerheads, aerators, and water conservation kits were advertised through inserts in the water bills, and newspaper and radio advertisements. In addition, the Water Conservation Coordinator and the Water Conservation Specialists distribute low flow devices in the performance of their daily duties. Since 2002, the DWP has tracked the monthly distribution and cost of the low flow devices via monthly statements of the Water Conservation Department budget.

### **2.4.5 BMP 3: System Water Audits, Leak Detection, and Repair**

To determine the extent of and potential for system leaks, the DWP conducts regular metered water production versus metered water sales mass balance audits to detect unusual changes in the water operation. The goal is to minimize water losses and increase overall system efficiencies.

The DWP performed a full system audit in 2001, when 167 miles of the distribution system was surveyed. They have been active in locating and repairing leaks (Table 2-14), and respond immediately to repair leaks that occur. Field personnel are trained to recognize potential service and main line leaks. Pipelines with chronic leak problems are replaced.

<b>Table 2-14 Leak Detection and Repair 2001-2005</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
% of unaccounted water	11.41%	7.60%	7.72%	6.25%	4.8%
Miles of distributions lines	167	0	0	0	0
# of Main leaks repaired	82	66	47	42	40
Pipeline replaced *	52,147 feet = 9.88 miles				
Actual Expenditures - \$	\$103,565	\$70,262	\$55,165	\$50,547	\$52,918

\* Total feet of pipeline replaced 2000-2005. Yearly data not available

When the DWP purchased the system from Southern California Water Company in 1989, the percent of unaccounted for water was at 29.6%. At that time, the DWP applied for and obtained a low-interest loan from the State of California, and began a significant leak detection and repair program. Between 1990 and 2000, the DWP replaced over 108,000 feet (20.5 miles) of the leakiest pipes in the system, reducing the unaccounted for water from 29.6% to 11.05%. Additional improvements have further reduced the unaccounted for water to 4.8% in 2004, a rate that is expected to continue into the future. Since 1990, over 30.3 miles of pipelines have been replaced in the DWP system.

Sufficient revenue is and will continue to be allocated for conducting system water audits, leak detection, and repairs.

#### **2.4.6 BMP 4: Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections**

As of November, 2005, the DWP has a total of 15,316 accounts. These are further broken down into 13,435 single family residential units, 1,317 multi-family residential units, 525 commercial accounts, and 39 institutional and government accounts. All accounts are metered and are billed based on the volume of water used, per hundred cubic feet (Table 2-15). Meter replacement was not projected since all accounts are presently metered.

<b>Table 2-15 Unmetered Accounts</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
# of unmetered accounts	2	2	1	0	0
# of retrofit meters installed	0	1	1	0	0
# of accounts without commodity rates	0	0	0	0	0

The DWP is committed to requiring all accounts within their service area to have meters. Beginning in 1989, the DWP required a water meter on all new services and all existing nonmetered services upon a change of ownership and all consumers who used large quantities of water. The last nonmetered account was changed to a metered account in 2003. Presently, all water services are metered and are billed based on the volume of water used.

The DWP has considered implementing a program to provide incentives to switch mixed-use accounts to dedicated landscape meters, but determined that such a program would not be cost effective. An actual feasibility study was not performed, but the Water Conservation Coordinator did some investigation and calculations to determine that there is not enough irrigation demand outside the government customers to justify the program. The customers with the greatest landscape water use are schools, the City of Big Bear Lake, and parks. These government agencies are on fixed fee accounts. Adding dedicated irrigation meters to these customers would not provide water use reduction, or cost savings. The DWP has found it more cost effective and more water efficient, to actively pursue the total reduction in the quantity of irrigated landscapes. This is done via the Landscape ordinance, and the turf buy-back program.

To estimate the actual water savings from the implementation of the BMP is difficult. The DWP was originally owned by the Southern California Water Company (SCWC), a private organization. When the City of Big Bear Lake purchased the assets of the SCWC, they immediately began installing meters on unmetered accounts. In addition to this program, the DWP implemented many other water conservation programs at the same time.

#### **2.4.7 BMP 5: Large Landscape Conservation Programs and Incentives.**

The DWP does not have a formal large landscape water conservation program. Landscape surveys are performed by the Water Conservation Coordinator on request. During these surveys, the Coordinator examines the sprinkler system and landscaping, and makes recommendations for improvement. Since these surveys have been informal, records have not been kept as to the number of surveys and the costs for the surveys historically. Beginning in 2005, the DWP began tracking outdoor irrigation audits.

Landscape water usage is controlled primarily by ordinance (see “Regulations for Efficient Water Use of Landscapes” below) and tiered water rates. Large landscapes are generally limited in the Big Bear Valley due to a variety of factors, including the mountain/forest environment, and the large number of “vacant” (vacation/second) homes. Large landscapes in new construction are restricted by ordinance.

At present, the DWP has a few customers on dedicated irrigation meters. But has not assigned water use budgets to any of these accounts. The DWP provides a number of incentives to encourage landscape water use efficiency. A Turf Buy Back Program has been implemented, the DWP reimburses customers who voluntarily remove turf grass from their property. Under this program, the reimbursement rate is \$0.40 per square foot for turf removed in excess of 500 square feet, along with the removal of the respective irrigation system. The Turf Buy Back Program, implemented in early 2005, has resulted in the removal of 25,590 square feet of turf grass from the DWP service area, as of December, 2005.

Through the DWP's tiered pricing structure, customers are encouraged to minimize landscape water use in order to avoid the higher priced tiers. Customers are notified in their bills about the requirement to shutdown and winterize their irrigation systems from November 1 to April 1. New customers or those changing service are notified of the landscape ordinance, and are required to comply if there is new construction or renovation. The DWP has no irrigated landscapes at its facility, and serves as an example to other Commercial, Industrial and Institutional (CII) customers.

The CUWCC's coverage requirements state that no less than 20% of CII accounts with mixed-use meters should be contacted each year and offered a landscape water use survey. The DWP will begin implementing this program in 2006, offering 20% of its commercial/industrial/institutional accounts the opportunity to have a landscape survey performed. For 2006, that is expected to be a total of 104 accounts based on a CII total of 522 accounts. A response rate of 25% is assumed, for a total of 26 surveys to be performed in 2006. Assuming a survey takes 8 hours to perform, an average cost per survey of \$250 for a total of \$6,500. CUWCC estimates a 15% reduction in outdoor CII water use as a result of a landscape survey. In 2004, each CII customer used an average of 0.82 acre-feet (per DWP customer records). The total water reduction as a result of 26 surveys would be 3.2 acre-feet, or approximately \$2,000 an acre foot for the first year.

Table 2-16 outlines the planned implementation of this DMM.

<b>Table 2-16 Projected Landscape Water Use Surveys</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of surveys offered	104	110	116	122	128
# of surveys performed	26	28	29	31	32
Projected expenditures	\$6,500	\$7,000	\$7,540	\$8,060	\$8,320
Projected water savings (AF/Y) *	3.2	3.4	3.6	3.8	3.9

\* The savings listed above are not cumulative

***“Regulations for Efficient Water Use on Landscapes”***

The Landscape Ordinance, was approved by the Board of Commissioners of the Department of Water and Power of the City of Big Bear Lake on October 24, 2004 for the planning and installation of appropriate water conserving landscapes within the DWP service area in the Big Bear Valley.

This regulation has several water use policies and requirements pertaining to landscaping and water conservation. These include:

- Restrictions on nonessential water uses;
  - No washing of sidewalks and driveways,
  - All water for decorative water features must be part of a recycled system,
  - No landscape irrigation during daylight hours from April 1 to November 1,
  - No use of water from fire hydrants except for fire protection,
  - Washing of vehicles without a bucket and shut off nozzle on hose,
  - No flooding of gutters, driveways or streets,
  - No leaks allowed, any found must be repaired in a timely manner.
- Restrictions of turf grass installation and other landscaping;
  - No more than 500 square feet allowed to be installed,
  - Turf and water features may not exceed 25% of landscaped area,
  - All slope and soil conditions that may cause excessive runoff must be identified and resolved during planning process,
  - Landscape plants must be grouped by similar irrigation requirements and irrigation systems must be set up to irrigate individual water-use zones in accordance with their individual needs,
  - Landscape elements must be appropriately maintained to maximize water use efficiency.
- Restrictions on Irrigations;
  - Automatic irrigation control systems are required on all landscapes greater than 1,000 square feet,



- Sprinklers are only allowed on turf and other groundcovers. All other landscape plantings must be irrigated with efficient devices, such as drip system or bubblers,
  - Sprinklers may not be used on planter strips less than 10 feet wide.
  - All irrigation controllers must be equipped with rain shut-off sensors.
  - All irrigation systems must be shutoff and winterized between November 1 and April 1 annually.
  - All sprinkler, emitter, pipe and pond leaks must be repaired in a timely fashion and all irrigation systems must be tested and inspected before regular usage each spring.
- Guidelines for promoting groundwater recharge and controlling erosion;
- All building roof runoff must be captured in infiltration systems, downspout runoff must be directed to a dry well system.
  - All slopes must be evaluated for their erosion potential and appropriate measures taken to minimize erosion. All areas susceptible to erosion must be addressed with an erosion prevention plan.

The ordinance also includes new requirements for the submission of landscape plans, penalties for failure to comply, and an appeal process. Please note that this ordinance only applies to new construction, or renovation of existing properties. These requirements are not retroactive to existing residents and customers.

#### **2.4.8 BMP 6: High-Efficiency Washing Machine Rebate Programs**

The City of Big Bear Lake Department of Water and Power (DWP) does not presently have a high-efficiency washing machine rebate program. But the DWP does have a ordinance requiring the use of high-efficiency washing machines in new construction, in its water waste prohibition ordinance, which is part of its "Regulations for Efficient Water Use on Landscapes" ordinance. The ordinance states, "All structures in new residential developments shall be equipped with low water use dishwashers (10 gallons/load or less) and washing machines (25 gallons per load or less)." In addition, for existing residential customers, the ordinance states, "Residential customers in existing developments shall be encouraged to install water efficient dishwashers (10 gallons per load or less) and washing machines (25 gallons per load or less) upon replacement."

Water savings per washing machine installed is estimated by the CUWCC to be 21.5 gallons per day, based on a single-family household of 3 people. That works out to 7,848 gallons per year, or 0.0241 acre-feet per year. It is also estimated by the CUWCC that the cost difference between regular washing machines and high-efficiency washing machines is approximately \$400. Using the cost difference as the rebate amount, the total cost per acre-foot for the first year is \$16,598 per acre-foot. Assuming a 14 year life for the washing machine, per the CUWCC, the cost per acre-foot of water saved over the lifetime of the machine is \$1,185. This is significantly higher than that of ultra-low flow toilet, showerhead, and faucet aerator retrofits. It should also be noted, that the price differential between high efficiency and conventional washing machines should decrease as the market for high efficiency washers develops, which will make this program more economic, and thus attractive for water savings.

There are potential water savings limitations associated with the implementation of a high-efficiency washing machine rebate program. Since 75% of the homes in the service area are vacation homes or second homes, the water savings estimated would likely only be realized for the 25% that are full time residents. In addition, there is a concern that once the rebate is received from the DWP for the washing machine, the customer could remove the machine and reinstall it in their primary home outside the DWP service area, resulting in no water savings to the DWP. And finally, since so many of the homes are vacation and second homes, those homes commonly do not have washing machines at all.

The DWP plans to implement a high-efficiency washing machine rebate program in the future, once it has exhausted the available ultra-low flow toilet, showerhead, and faucet aerator retrofits. The program is planned to begin in 2011.

#### **2.4.9 BMP 7: Public Information Programs**

The City of Big Bear Lake Department of Water and Power maintains an active public information program, organized and maintained by the Water Conservation Coordinator and designed to educate the public and businesses on water supply issues and conservation. The public information program disseminates information to the public through a variety of means. These include:

- Local newspapers and radio advertisements
- Restaurant table tents, hotel door hangers, business placards
- An Informative website

Public information programs have been included in the Conservation department's budget, and the actual expenditures spent on public information have been tracked through that budget since the Water Conservation Coordinator took over the department in January 2003. From 2000-2001, various public information activities were performed (Table 2-17), but the available information on the costs of those activities is limited. Historically, the DWP has not kept records on the number of activities funded through the program. Beginning in 2006, the Conservation department will track both the number of activities, and the expenditures associated with the public information program for reporting purposes.

<b>Table 2-17 Past Expenditures for Public Information</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Paid advertising	\$2,121	\$13,515	\$33,585	\$42,719	\$60,703
Bill Inserts / Newsletters / Brochures	\$817	\$4,790	\$7,407	\$5,774	\$75,647
Demonstration Gardens	0	\$513	\$10,900	\$6,836	\$1,045
Speakers	0	0	\$1,135	\$1,135	0
Program to coordinate with other government agencies, industry and public interest groups and media	0	0	0	\$5,691	\$5,691
Actual expenditures - \$	\$2,938	\$23,418	\$53,030	\$62,155	\$143,086

<b>Table 2-18 Planned Expenditures for Public Information</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Paid advertising	\$41,000	\$41,000	\$42,000	\$42,000	\$43,000
Bill Inserts / Newsletters / Brochures	\$6,000	\$6,000	\$6,500	\$6,500	\$7,000
Demonstration Gardens	\$6,000	\$6,000	\$6,500	\$6,500	\$7,000
Speakers	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Program to coordinate with other government agencies, industry and public interest groups and media	\$6,000	\$6,000	\$6,000	\$6,000	\$4,000
Actual expenditures - \$	\$60,000	\$60,000	\$62,000	\$62,000	\$64,000

The activities in each category include such activities as:

- Paid advertising – advertising in the local newspapers (Big Bear Grizzly, Big Bear News, etc), advertising on the local radio station (KBHR), highway signs, bus stop signs, and other signs and advertisements.
- Bill Inserts/Newsletters/Brochures – bill inserts, conservation posters, hotel hangers, restaurant table tents, fliers, resort magnets, children's booklets, and other assorted handouts.

- Demonstration Gardens – xeriscape plant information, tours of xeriscaped homes, plants, and landscapers.
- Speakers – public speakers on water conservation / water efficiency.
- Programs to coordinate with other government agencies, industry, and media – ad campaign, strategic planning.

The DWP is committed to funding public information programs at a similar or higher level in the coming years (Table 2-18). While actual water savings are impossible to quantify, the DWP feels that continuing public education is vital in keeping water conservation in the public's mind. A public aware of the need for water conservation is more likely to conserve.

#### 2.4.10 BMP 8: School Education Programs

At present, DWP has school programs for third and fourth grades at the three elementary schools in the DWP service area (Table 2-19). The first classroom presentation was held in 2001, and has continued to the present. Each presentation reaches two classes, with an estimated 60 students, for a total of approximately 350 students attending the presentations in 2005. The DWP has not held any workshops or presentations specifically for teachers.

Table 2-19 Past School Education Programs						
	# of classes	2001	2002	2003	2004	2005
Grades K – 3rd	6	1	3	3	3	4
Grades 4 <sup>th</sup> – 6th	6	0	3	3	3	3
Grades 7 <sup>th</sup> – 8th	0	0	0	0	0	0
High School	0	0	0	0	0	0
Actual expenditures - \$		\$500	\$500	\$2,225	\$3,815	\$7,924

In addition to six regular classroom presentations held in 2005, the DWP sponsored the First Annual Children's Water Festival, in May 2005. This event was held at Northshore Elementary Schools, and was attended by approximately 460 third and fourth graders from the entire school district. Fourteen local agencies, organizations, and companies participated in the presentation of this festival. The children spent the day learning about environmental issues, water conservation, and the importance of protecting underground aquifers; participated in a variety of activities, and received a variety of materials to take home. The First Annual Children's Water Festival was a success, and the DWP is committed to participating in the Festival on a biennial basis.

<b>Table 2-20 Planned School Education Programs</b>						
	<b># of classes</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Grades K – 3rd	6	4	4	4	4	4
Grades 4 <sup>th</sup> – 6th	6	3	3	3	3	3
Grades 7 <sup>th</sup> – 8th	0	0	0	0	0	0
High School	0	0	0	0	0	0
Planned expenditures - \$		\$8,000	\$8,200	\$8,400	\$8,600	\$9,000

The DWP will continue the existing school education program for third and fourth graders, as well as participating in Children's Water Festival, into the future (Table 2-20). Through these programs, they can reach the majority of third and fourth graders who live in the service area. This education program is a cost-effective means to provide early education of young water users in order to provide long-term beneficial impacts to the local water supply. Sufficient revenue is and will continue to be allocated for these programs.

#### **2.4.11 BMP 9: Conservation Programs for Commercial, Industrial and Institutional (CII) Accounts**

The DWP has not implemented a formal commercial, industrial, and institutional conservation program. As of November, 2005, of the 15,316 accounts, 525 are commercial accounts, and 39 are institutional (government, etc) accounts. There are no industrial accounts in the DWP system, but there are 12 customers that are located in Industrial zoned areas.

The DWP has included commercial accounts in several other conservation programs they have implemented. As part of BMP 5, Large Landscape conservation programs and incentives, the DWP has provided landscape surveys to CII customers. Ultra-low flow toilet replacements, and bathroom retrofits have been provided to CII customers as well (Tables 2-22 and 2-23). It is assumed that up to 50 CII ULFT replacements per year will occur until 2010.

CUWCC's guidelines indicate that 10 percent of CII accounts are to be surveyed in 10 years (Table 2-21). As of 2005, there were 525 commercial accounts and 39 institutional accounts. The guidelines also suggest that 10% of all commercial customers be contacted each year with an offer to have a water use survey performed. The survey must include a site visit, evaluation of water using apparatus and processes, and a report to the customer identifying recommended efficiency measures. A follow-up visit is to be held one year after the survey.

<b>Table 2-21 Planned CII Water Use Surveys</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of on-site surveys offered	56	56	56	56	56
# of on-site surveys performed	28	28	28	28	28
# of follow-up visits	0	28	28	28	28
Planned expenditures - \$	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000
Estimated water savings – AF/Y**	4	4	4	4	4

\* This table assumes a 50% response rate on the water survey offers.

\*\* These totals are the first year water savings only

The estimated cost per water survey for the DWP will be approximately \$500, for the initial survey and follow-up visit. Potential or planned water savings are difficult to quantify. Savings are based on the types of conservation measures available for implementation by the CII account, whether those measures are implemented or not, and whether they reach the full potential savings of the measure. The CUWCC estimates a water savings of approximately 12% following a water survey. Based on the average usage for each customer type, a normal rainfall year, the number of surveys planned, and the estimated 12% savings, the first year water savings for the planned surveys total approximately 4 acre-feet per year. Cost per acre-foot of estimated water savings is \$3,500, for the first year. That cost will decrease in the event that the water savings from the surveys continue into subsequent years.

### *CII Toilet Replacements*

<b>Table 2-22 Past CII Toilet Replacements</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
# of CII replacements	0	0	0	6	316
Actual expenditures - \$	-	-	-	\$450	\$79,000
Actual water savings – AF/Y	-	-	-	0.21	10.9

<b>Table 2-23 Planned CII Toilet Replacements</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of CII replacements	50	50	50	50	50
Planned expenditures - \$	\$12,500	\$12,500	\$12,500	\$12,500	\$12,500
Planned water savings – AF/Y	1.74	1.74	1.74	1.74	1.74

Please note that the water savings in the tables above represents the first year savings for the toilets retrofitted, and not a cumulative savings over the life of the toilet. For the first year, the cost per acre-foot of water savings is \$7,184. Assuming a 20 year life of the new toilets, the cost per acre-foot of water savings is \$360 over the life span of the ULFT retrofits.

## 2.4.12 BMP 11: Conservation Pricing

The City of Big Bear Lake Department of Water and Power (DWP) first instituted conservation pricing to their customers in 1992. Over the years, the tiered pricing rates have been changed to further increase the cost associated with the higher tiers as an effort to encourage water conservation.

The tiered rates apply to single family residential and multi-family residential accounts (Table 2-24). The charges are based on the total quantity of water used during the 2 month billing cycle, in hundred cubic feet of water (ccf).

<b>Table 2-24 Tiered Water Rates for Residential Accounts</b>		
<b>Tier</b>	<b>Usage</b>	<b>Cost</b>
Tier 1	First 24 ccf	\$2.06 each
Tier 2	Next 16 ccf (25 to 40 ccf)	\$2.86 each
Tier 3	Next 20 ccf (41 to 60 ccf)	\$4.27 each
Tier 4	Next 40 ccf (61 to 100 ccf)	\$7.04 each
Tier 5	All usage over 100 ccf	\$9.77 each

For commercial, industrial and institutional (CII) accounts, the tiered pricing structure is different than above. Parks and schools are billed at a flat rate of \$2.06 per ccf. The commercial pricing structure is divided into 20 different rate codes, each code corresponds to a different base volume. The base volume is charged \$2.06 per ccf. Each commercial account is evaluated every couple of years and assigned to one of the 20 base volume codes. The breakdown of CII pricing codes is provided in Appendix D. While the pricing for each tier remains the same as the table above, the quantity of water used in each tier varies based on the CII code.

In addition to the above charges per ccf of consumption, the customer is also required to pay operation and maintenance, debt service, and system rehabilitation fees (Table 2-25). These fees are based on the size and type of meter installed for that customer. For the vast majority of customers, both residential and business, who have a 5/8" meter, the breakdown of the fees is shown below. These service charges are included in each billing cycle.

<b>Table 2-25 Service Charges for Residential Accounts</b>	
<b>Type of Charge</b>	<b>Cost</b>
Operation and Maintenance	\$8.36
Debt Service	\$35.60
System Rehabilitation	\$14.26
Total Service Charges	\$58.22

For other meter sizes, the following rates apply:

Table 2-26 Fees per Meter Size					
Meter Size	Residential Bimonthly	Business Monthly	Business Monthly Fire Service	Business Monthly – Compound Meter	Rim Forest Bimonthly Charges
5/8"	\$58.22	\$29.11	-	-	\$70.04
1" (fire)	\$66.22	-	-	-	\$78.04
1"	\$114.10	\$57.05	-	\$151.32	\$128.30
1 ½"	\$146.28	\$73.14	-	-	\$161.86
2"	\$190.28	\$95.14	-	\$179.19	\$207.76
3"	\$321.06	\$160.53	-	\$183.54	\$344.16
4"	\$429.18	\$214.59	\$15.08	\$214.59	\$456.94
5"	-	-	-	\$295.51	-
6"	\$713.34	\$356.67	\$22.63	\$409.11	\$753.30
8"	\$1020.14	\$510.07	\$30.18	-	-
10"	\$1020.14	\$510.07	\$37.72	-	-
12"	-	-	\$45.26	-	-

The DWP is presently in the process of preparing a Water Master Plan, and as part of the Water Master Plan, a Financial Plan and Rate Study will be performed. Based on the results of that rate study, a new CII pricing structure may be introduced, with fewer base codes. This new pricing structure will reflect the cost of producing water and provide more incentive to conserve. The new CII tiered pricing structure is expected to be implemented in 2007.

#### 2.4.13 BMP 12: Water Conservation Coordinator

The DWP presently (2005) employs two full-time people working in the water conservation department, a Water Conservation Coordinator and a Water Conservation Specialist. In addition, the DWP typically hires one or two additional Water Conservation Patrol employees during the summer months (Table 2-27). The Patrol employees concentrate on enforcing the DWP's Water Conservation ordinance. The DWP plans on maintaining full-time positions for the Water Conservation Coordinator and at least one Specialist, with two part-time Patrol positions to be filled during the summer months (Table 2-28).

Bill La Haye is the present Water Conservation Coordinator for the DWP. He was originally hired in January 2003 as a Water Conservation Specialist on a part time basis. In June 2005, Bill started working full-time for the DWP as their Water Conservation Coordinator. As part of his duties as Water Conservation Coordinator, Bill manages the Water Conservation Program for the DWP as well as assists with other special projects. He coordinates the DWP's website, is the primary contact person for the media, and is the DWP's low water-use landscape specialist. His education consists of a Bachelor's Degree in Geology, and a Master's Degree in Natural Resources with an emphasis on Wildlife Management. His experience includes: installing, repairing and testing domestic and agricultural pumps and wells in Northern California, designing agricultural irrigation systems, and coordinating



research projects throughout Northern and Southern California studying natural vegetation. He is also a specialist in drought tolerant plants and landscapes in the Big Bear Valley, and owned an extensive cactus collection. Portions of his cactus collection are housed at the Huntington and Moorten's Botanical Gardens.

Jennifer McCullar is the current full-time Water Conservation Specialist. She joined the DWP in June 2005. Her primary duties include management of two of the DWP's newest conservation programs: the Retrofit upon Change in Service Program and the Offset Demand Program, as well as assisting Bill La Haye with the many ongoing programs and efforts in the Water Conservation Department. Her education consists of both an undergraduate and graduate degree in Finance. Her previous work experience includes working as the Executive Director of the Big Bear Chamber of Commerce, as well as Vice President of Structured Finance at LaSalle National Bank in Chicago, IL.

<b>Table 2-27 Conservation Department 2001-2005</b>					
<b>Actual</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
# of full-time positions	0	0	0	0	2
# of part-time staff	0	1	1	3	1
Position supplied by other agency	0	0	0	0	0
Actual expenditures - \$	0	\$78,257	\$81,704	\$110,000	\$200,000

<b>Table 2-28 Planned Conservation Department 2006-2010</b>					
<b>Planned</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of full-time positions	2	3	3	3	3
# of part-time staff	2	2	2	2	2
Position supplied by other agency	0	0	0	0	0
Projected expenditures - \$	\$220,685	\$250,000	\$260,000	\$270,400	\$281,000

Evaluating this BMP's effectiveness is very difficult. One method would be to compare the water demand in years where the DWP did not have a Water Conservation Coordinator to those years where there was a Coordinator. Since it is the job of the Coordinator to ensure that water conservation measures are being followed, and to develop new conservation measures, it would be difficult to separate the water savings due to the conservation measures, or due to the existence of the Conservation Coordinator. The Department of Water and Power is committed to the continuation of the Conservation Department, and is confident that the water savings due to the Department offset the costs associated with maintaining the Department.

#### **2.4.14 BMP 13: Water Waste Prohibition**

The DWP has had a water waste prohibition ordinance in effect since 1989, as part of their “Regulations for Efficient Water Use on Landscapes” ordinance. The most recent update to the ordinance was enacted in October, 2004 as Resolution No. DWP 2004-08. This resolution updated many of the provisions of the earlier resolutions, making many provisions more stringent than earlier.

The ordinance prohibits the nonessential use of water, defining it as wastage of water. Some nonessential uses of water defined in the ordinance include:

- There shall be no washing, using water from a hose, of sidewalks, walkways, driveways, parking areas, patios, porches, or verandas, buildings, and structures, except when needed to protect public health and safety.
- No water shall be used to clean, fill, operate, or maintain levels in decorative fountains unless such water is part of a recycling system.
- No person shall permit water to leak from any facility on his premises, and all leaks shall be repaired in a timely manner.
- Commencing April 1<sup>st</sup>, and terminating November 1<sup>st</sup>, annually, there shall be no irrigation between the hours of 9 a.m. and 6 p.m. Irrigation shall not exceed the needs of the plants being watered or be applied at a rate and quantity that causes runoff.
- Noncommercial washing of privately owned vehicles, trailers, buses, or boats must be conducted through the use of a bucket and a hose equipped with a shut-off nozzle.
- There shall be no use of water from a fire hydrant, except for fire protection purposes.
- The size of all water features (ponds, fountains, streams, etc.) combined will be limited to 500 square feet of total surface area.

The ordinance also updates and modifies many of the landscape provisions of the previous ordinance, provides requirements for the submission of landscape plans, and provides penalties for failure to comply with any of the provisions.

The DWP has not implemented a program to survey the number and types of water softeners installed in the service area. If a water softener is present, it will be inspected during the indoor water audit survey, but records are not kept of the type or number found. No formal program encouraging the use of more efficient types of water softeners has been implemented due to the lack of knowledge of the use of water softeners in the service area. The DWP will begin to track the number and type of water softeners during home water audits surveys in 2006 and reevaluate the need

for an ordinance, and education program once further data has been obtained and analyzed.

The actual or projected costs of the water waste prohibition are associated with its enforcement. During the summers, the DWP typically hires one or two part time Water Conservation Patrol employees to aid in ordinance enforcement. The expenditures associated with the salary, benefits, etc. of these employees are detailed in BMP 12, Water Conservation Coordinator, and are also listed in Table 2-29. Two part-time patrol employees were hired in 2004, and one in 2005. The DWP anticipates having the funding for two patrol employees per year for the foreseeable future. The number of on-site visits is from BMP 1, Water Surveys, and is based on the projected number of surveys the DWP expects to perform (Table 2-30).

<b>Table 2-29</b> <b>Summary of Past Water Waste Prohibition 2001-2005</b>					
	2001	2002	2003	2004	2005
Waste ordinance in effect	Yes	Yes	Yes	Yes	Yes
# of on-site visits	N/A	N/A	N/A	N/A	N/A
Water softener ordinance	No	No	No	No	No
Actual expenditures - \$	N/A	N/A	N/A	\$35,000	\$17,500

<b>Table 2-30</b> <b>Summary of Anticipated Water Waste Prohibition 2006-2010</b>					
	2006	2007	2008	2009	2010
Waste ordinance in effect	Yes	Yes	Yes	Yes	Yes
# of on-site visits	100	100	100	100	100
Water softener ordinance	No	No	No	No	No
Actual expenditures - \$	\$35,000	\$36,000	\$37,000	\$38,000	\$39,000

N/A – information not available

## 2.4.15 BMP 14: Residential Ultra-Low-Flush Toilet Replacement Programs.

# of pre-1992 Single Family Units = 13,000

# of pre-1992 Multi-Family Units = 420

The DWP has instituted an Ultra-Low Flow Toilet (ULFT) replacement program in January 2000. This program was briefly suspended due to inadequate funding, in 2001, and continued it through 2003. The DWP purchased ultra low flow toilets, which were installed by the customer. A member of the DWP staff would go to the residence or business to verify that the toilets were actually installed and that they replaced a non-ULFT. Other than installation costs, this program was free to the customers (Tables 2-31 and 2-32).

A rebate program was then implemented in January 2004. This replacement program consisted of a rebate program, granting customers a rebate of \$75 per ULFT retrofitted. The purchase and installation of the ULFT was the responsibility of the customer, and the work was inspected, to verify that the old toilet was non-ULFT, by a member of the DWP staff prior to payment of the rebate. The rebate was paid as a credit on the customer's bi-monthly water bill.

Starting in August, 2005, the DWP began providing retrofits of high flow toilets with a free ULFT retrofit. The DWP bore the full cost of the toilet and installation. This project was funded by the Water Demand Offset Ordinance requiring contractors and developers to pay a Water Demand Offset fee based on the future demand of their respective development projects. These fees were used by the DWP to fund projects toilet retrofits.

<b>Table 2-31 Single Family ULFT Retrofits 2001-2005</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
# of ULF rebates	0	0	0	34	43
# of ULF direct installs	0	138	73	0	106
Actual expenditures - \$ *	0	\$32,016	\$16,936	\$2,491	\$21,840
Actual water savings – AF/Y **	0	4.79	2.53	1.18	3.85

\* - estimated based on 2005 cost per toilet, actual costs not available

\*\* - estimated water savings represents the one year savings for the toilets retrofitted in that year, and not a cumulative savings over the life of the toilet.

<b>Table 2-32 Multi-Family ULFT Retrofits 2001-2005</b>					
	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
# of ULF rebates	0	0	0	6	2
# of ULF direct installs	0	10	1	0	2
Actual expenditures - \$ *	\$0	\$2,320	\$232	\$450	\$614
Actual water savings – AF/Y **	0	0.35	.03	0.21	0.14

\* - estimated based on 2005 cost per toilet, actual costs not available

\*\* - estimated water savings represents the one year savings for the toilets retrofitted in that year, and not a cumulative savings over the life of the toilet.

The average water savings as a result of a toilet retrofit to an ultra low flow model ranges from 20 to 27 gallons per day per toilet in a single family residence based on number of persons in the household, using the primary calculation method of the CUWCC methodology. The DWP, when establishing their Water Demand Offset program, calculated the water savings from toilet replacement to be 31 gallons per day per toilet. For purposes of this BMP, 31 gpd per toilet, or 0.0347 acre feet per year per toilet, in both single and multi-family will be used. The cost per acre-foot of water savings is approximately \$2,111 for toilet rebates, and \$6,700 for direct installs for the first year. Assuming a 20 year life for a toilet, the cost per acre-foot over the lifetime of the toilet comes out to \$106 per acre-foot for rebates, and \$335 per acre-foot for direct installs. While the cost per acre-foot for rebates is significantly cheaper than for direct installs, customer participation is much higher for direct installs, allowing more

toilets to be retrofit. Since the funds for toilet replacement is coming out of the Water Demand Offset fees, and not the DWP general budget, the DWP will continue to offer direct installs to their customers as well as rebates.

The DWP is committed to a large scale toilet replacement program. The vast majority of homes in the DWP service area were built before 1992, and therefore the number of potential retrofit candidates is large. Seventy-five percent of the homes in the Big Bear Valley are considered “vacant,” meaning they are vacation and/or second homes. Retrofitting ULFTs into these “vacant” residences will result in significantly less water savings than if that same toilet was installed in a full time residence. The DWP is targeting full-time residents and businesses for retrofit first, based on water consumption, before beginning to retrofit the part-time residents.

The free ULFT retrofits performed in 2005, and those planned for the future, were, and will be funded with the Water Demand Offset fees. The DWP has a goal of completing 3000 retrofits, either by rebate or direct install, by 2010 (Table 2-33). The DWP has retrofitted 608 toilets to date. In order to reach 3000, they will need to retrofit 480 toilets per year from 2006 to 2010. By 2010, the diminishing returns of retrofitting part time, or “vacant” residences and businesses will begin to increase, and the DWP will look to other water conservation measures, or available retrofits, to utilize the demand offset fees on.

<b>Table 2-33</b>					
<b>Proposed Single Family ULFT Retrofits 2006-2010</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of ULF rebates	40	40	40	40	40
# of ULF direct installs	390	390	390	390	390
Planned expenditures - \$ *	\$93,500	\$93,500	\$93,500	\$93,500	\$93,500
Planned water savings – AF/Y **	14	14	14	14	14

\* - estimated based on 2005 cost per toilet, actual costs not available

\*\* - estimated water savings represents the one year savings for the toilets retrofitted in that year, and not a cumulative savings over the life of the toilet.

<b>Table 2-34</b>					
<b>Proposed Multi-Family ULFT Retrofits 2006-2010</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
# of ULF rebates	0	0	0	0	0
# of ULF direct installs	50	50	50	50	50
Planned expenditures - \$	\$11,600	\$11,600	\$11,600	\$11,600	\$11,600
Planned water savings – AF/Y	1.7	1.7	1.7	1.7	1.7

\* - estimated based on 2005 cost per toilet, actual costs not available

\*\* - estimated water savings represents the one year savings for the toilets retrofitted in that year, and not a cumulative savings over the life of the toilet.

# Section 3

## Water Demands

### 3.1 Overview

### 3.2 Future Water Demands

Projecting future water demands allows the DWP to determine if future water supply investments are needed to match expected demands. Water demand projections are used to schedule any investments to ensure they are online when needed, thus minimizing cost impacts due to idle facilities, or cost impacts due to inadequate supply. Future water demands here are derived from models being prepared for the DWP Water Master Plan.

#### 3.2.1 Consumptive Water Demand Forecast

Projected water demands in the Water Master Plan were estimated based on water billing data, future land uses as designated in the City and County General Plans, and changes in demographics. For purposes of this UWMP, estimated demand projections are provided to 2025.

To determine the water use by customer type, and the number of customers per type, the DWP customer database was used, as well as zoning and land use data from the City of Big Bear Lake and the County of San Bernardino. The DWP customer database contains the number of multi-family accounts, but does not take into account the number of units per account. In order to determine the actual number of multi-family units, rather than accounts, the land use data from the City and County General Plans was used, and an estimate of the number of multi-family units was derived. The table below lists both the number of single family and multi-family accounts, as well as the number of units of each. For the purposes of BMPs in Section 2, the estimated number of units was used.

In order to more effectively manage the water consumption in their service area, the DWP currently limits the number of new connections allowed to the system each year. The number of new connections allowed is determined by the Board of Commissioners of the DWP each year, and that decision is based on recommendations from the technical staff at the DWP. The number of new connections issued yearly generally ranges from 200-400 new connections, with 160-180 new connections being the recent average.

**Table 3-1  
Water Use by Customer Type – Past, Present and Future**

Year	Water Use Sector		Single Family	Multi-Family	Comm	Indust	Instit / Gov	Land	Agric	Total
2000	Metered	# of accounts	13,841	34	450	0	31	0	0	14,367
		Deliveries AF/Y	1,909	122	128	0	576	0	0	2,735
	Un-metered**	# of accounts	15	0	0	0	0	0	0	15
		Deliveries AF/Y	NA	0	0	0	0	0	0	NA
2005	Metered	# of accounts	14,706	46	525	0	39	0	0	15,316
		# of units	13,435	1,317	525	0	39	0	0	15,316
		Deliveries AF/Y	1,657	110	75	0	608	0	0	2,450
2010	Metered	# of accounts	15,625	62	613	0	49	0	0	16,349
		# of units	14,111	1,576	613	0	49	0	0	16,349
		Deliveries AF/Y	1,863	123	84	0	686	0	0	2,757
2015	Metered	# of accounts	16,602	84	715	0	62	0	0	17,462
		# of units	14,851	1,834	715	0	62	0	0	17,462
		Deliveries AF/Y	2,069	137	94	0	765	0	0	3,065
2020	Metered	# of accounts	17,639	114	834	0	78	0	0	18,664
		# of units	15,560	2,092	834	0	78	0	0	18,664
		Deliveries AF/Y	2,3275	150	104	0	843	0	0	3,372
2025	Metered	# of accounts	18,741	154	973	0	98	0	0	19,966
		# of units	16,545	2,350	973	0	98	0	0	19,966
		Deliveries AF/Y	2,479	166	113	0	921	0	0	3,679

\* The # of accounts for 2010-2025 were estimated based on the average growth during the 2000-2005 time period, weighted towards each customer type based on past development.

\*\* Unmetered accounts are not listed after 2000, when the last unmetered account was converted.

Between 2000 and 2005, the DWP issued an average of 189 new connections to their system. The number of new connections issued in 2005 was 160. Projecting the future demand for each of the customer types was performed based on the average new connections issued from 2000-2005.

One of the unique characteristics of the demographics in the Big Bear Valley is the number of vacant homes in the area. According to the State Department of Finance, 74 percent of the dwelling units within the City of Big Bear Lake are classified as vacant, the majority of these units assumed to be used as vacation homes and/or second homes. A similar percentage of vacant homes occur within the entire Big Bear Valley. When projecting future demands, one must consider the possibility that some of these vacation/second homes might become full-time residences.

Future water demands in the Water Master Plan were based on existing demands and incremental demands resulting from new development and occupancy conversion from part-time equivalent (vacation homes and/or second homes) to full-time equivalent. Currently, approximately 25 percent of existing accounts are considered to consume water as full-time equivalents. Water demand from the development of vacant lots and developed lots that could subdivide was estimated using unit flow factors derived for specific lot sizes. In addition, a percentage of the unit flow factors was randomly assigned to individual parcels to account and replicate the current occupancy distribution.

The potential of occupancy conversion from part-time equivalent to full-time equivalent was also considered when assessing future demand projections. Parcels that are currently consuming water as part-time equivalents (approximately 75 percent of existing parcels) were randomly assigned a probability of conversion to full-time equivalent. This was conducted to account for the possibility that people leaving outside of the service area could retire to the Big Bear Lake area and consume more water on a per unit basis as the residences that are used as vacation or second homes. Many conversion factors were considered to estimate future demands, from maintaining the present 25 percent full-time equivalence to a maximum of 50 percent full-time equivalence. This maximum percentage was considered as the maximum probable conversion that could take place in the service area.

Based on the above considerations of full development and 50 percent full-time equivalence, ultimate water demands were estimated at 4,829 ac-ft per year. At the present time, DWP controls the rate of development within the service area by limiting the number of new connections each year. Over the last 10 years, DWP has issued an average of 198 new connections per year. At this rate and based on an estimated 8,310 undeveloped and sub-dividable parcels, full build out will occur in 42 years or approximately by the year 2045. Assuming a linear increase in demand over the 42 years, a future demand for the years 2010, 2015, 2020, and 2025 was determined.



<b>Table 3-2 Average Annual Consumptive Water Demand – AF/Y</b>						
<b>Customer Class</b>	<b>Year</b>					
	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Residential	2,032	1,767	1,986	2,206	2,425	2,644
Commercial / Industrial	128	75	84	94	104	113
Public	576	608	686	765	843	921
<b>Total</b>	<b>2,735</b>	<b>2,450</b>	<b>2,757</b>	<b>3,065</b>	<b>3,372</b>	<b>3,679</b>

### 3.2.2 Additional Water Uses and Losses

As stated in Section 2, DWP does not actively engage in water exchanges or transfers on a regular basis.

Additional water uses must include unaccounted for water. For future projections and in the model for the DWP Water Master Plan it is assumed that system losses, or unaccounted for water, are 5% of the total amount pumped. This value is based on the percent unaccounted for water in 2004. Table 3-3 presents projected unaccounted for water.

<b>Table 3-3 Water Losses</b>						
	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Demand	2,735	2,450	2,757	3,065	3,372	3,679
Unaccounted for water (5%)	137	123	138	153	169	184
<b>Total</b>	<b>2,872</b>	<b>2,573</b>	<b>2,895</b>	<b>3,218</b>	<b>3,541</b>	<b>3,863</b>
% of 2005	111%	100%	113%	125%	137%	150%

### 3.2.3 Total Water Uses

Total water use is the summation of the consumptive water demands presented in Table 3-2, and the additional water uses in Table 3-3. Table 3-4 summarizes the total future water uses under normal weather conditions.

<b>Table 3-4 Total Water Demands 2000-2025</b>						
	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
<b>Total Demand</b>	<b>2,872</b>	<b>2,573</b>	<b>2,895</b>	<b>3,218</b>	<b>3,541</b>	<b>3,863</b>

## Section 4

# Water Shortage Contingency Plan

In April, 2004, the DWP Board of Commissioners (Board) adopted a resolution to update the General Water Conservation Guidelines and add regulations for water shortage emergencies in the Big Bear Valley. This resolution superseded two previous conservation resolutions, passed in June 1989, and November 2003. The resolution updates the General Water Conservation Guidelines, establishing policies and requirements, as well as instituting penalties and an appeal process for failure to comply. This resolution also adds regulations for Non-Water Shortage Emergencies (such as wildfires, earthquakes, emergencies other than drought) establishing policies and regulations to be followed in the event of an emergency. This resolution also contains a Water Shortage Emergencies section, which establishes policies and regulations to be followed, and implements conservation stages in the event the Board declares a water shortage emergency.

The Board may declare a Water Shortage Emergency when below average precipitation results in declining water levels in DWP production wells to such a point that continued delivery of water to the DWP customers is projected to be threatened, immediately or within the foreseeable future. The Board, after declaring an emergency, shall determine the Conservation Stage that is appropriate at the time, based on the resolution, and consultation with the Technical Review Team. The Board will consider the following when determining the Conservation Stage:

- Current ground water levels
- Recent trends in ground water levels.
- The previous winter's precipitation.
- The previous year's water demand.
- Current and anticipated demand for water by DWP customers.
- Current and anticipated production capacity of DWP water sources.
- Damage to the DWP's water system.
- Anticipated ability to optimize use of above-ground water storage.
- Predicted weather patterns.

The Board will consider these conditions and declare one of four water conservation stages, depending on the severity of the emergency as determined by the Board. The water use restrictions listed under each Conservation Stage, provide general water use regulations to be implemented during water shortage emergencies. Additional restrictions may be recommended by the Technical Review Team, as they are determined necessary. Additional restrictions may be issued by the Board, whenever it convenes, to review new emergency conditions and/or reevaluate appropriate Conservation Stages.

## 4.1 Stages of Action

### **Water Code section 10632 (a)**

*The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier: (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.*

The DWP Water Shortage Emergencies resolution establishes four water conservation stages, depending on the severity of the emergency as determined by the Board. Each stage of action has a set of conservation measures.

Water code section 10632 of the Urban Water Management Plan Act requires a shortage situation of 50 percent reduction in water supply to be addressed. Presented below are the four water stages and the actions that are taken for each stage. Conservation Stage IV, will provide adequate conservation during a water shortage of up to a 50 percent reduction in water supply and is discussed below.

### **Conservation Stage I**

1. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 5% below their average monthly consumption during Conservation Stage I.
2. Outdoor water-use shall be reduced by at least 15% below their monthly consumption during Conservation Stage I.
3. Landscape irrigation will be permitted only on odd or even days of the month, depending on whether the last number of the customer's street address is odd or even.
4. Landscaping permits will be required for all new or retrofitted turn installations.
5. The square footage of turf shall be limited to 1,000 square feet for new or retrofitted landscapes.

6. DWP will promote indoor water-use conservation.
7. All water used for construction will be metered.
8. All new landscapes and modifications to existing landscapes greater than 1,000 square feet, shall be required to obtain a landscaping permit prior to beginning work.
9. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months, shall be exempt from the water use reductions described in items 1 and 2 above, provided their water use remains at this level or lower for the duration of the water emergency.

### **Conservation Stage II**

1. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 10% below their average monthly consumption during Conservation Stage II.
2. Outdoor water-use shall be reduced by at least 30% below their average monthly consumption during Conservation Stage II.
3. Indoor water-use shall be reduced by at least 5% below their average monthly consumption during Conservation Stage II.
4. Outdoor irrigation will be permitted only on days authorized by the DWP.
5. All new landscapes and modifications to existing landscapes greater than 1,000 square feet, shall be required to obtain a landscaping permit prior to beginning work.
6. No new turf will be permitted at any location, new or existing.
7. No DWP water may be used for soil compaction or dust control.
8. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months, shall be exempt from the stipulations in items 1, 2 and 3 above, provided their water use remains at this level or lower for the duration of the water emergency.

### **Conservation Stage III**

1. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 25% below their average monthly consumption during Conservation Stage III.
2. Outdoor water-use shall be reduced by at least 60% below their monthly average consumption during Conservation Stage III.

3. Indoor water-use shall be reduced by at least 10% below their average monthly consumption during Conservation Stage III.
4. Landscape irrigation will be permitted only two days per week, on days designated by the DWP.
5. No DWP water shall be used for ponds, streams, or fountains with a capacity greater than 50 gallons.
6. No new turf will be permitted at any location, new or existing.
7. All new landscapes and modifications to existing landscapes, greater than 1,000 square feet shall be required to obtain a landscaping permit prior to beginning work. All new plant material must be low water use (Xeriscape).
8. No DWP water may be used for soil compaction or dust control.
9. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months, shall be exempt from the stipulations in items 1, 2 and 3 above, provided their water use remains at this level or lower for the duration of the water emergency.

#### **Conservation Stage IV**

1. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 45% below their average monthly consumption during Conservation Stage IV.
2. Outdoor water-use shall be reduced at least 90% below their monthly consumption during Conservation Stage IV.
3. Indoor water-use shall be reduced at least 20% below their average monthly consumption during Conservation Stage IV.
4. No outdoor water use shall be permitted, except commercial car washes that recycle water.
5. No landscape irrigation shall be permitted.
6. No DWP water shall be used for ponds, streams, fountains and new or unfilled swimming pools.
7. No new turf will be permitted.
8. No DWP water may be used for soil compaction or dust control.

9. All new landscapes and modifications to existing landscapes greater than 1,000 square feet shall be required to obtain a landscaping permit prior to beginning work. Only landscape items requiring no water to establish or maintain may be installed.
10. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months shall be exempt from the stipulations in items 1, 2 and 3 above, provided their water use remains at this level or lower for the duration of the water shortage emergency.

## 4.2 Estimate of Minimum Supply for Next Three Years

### *Water Code section 10632 (b)*

*An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.*

To estimate the three year minimum water supply, the historic three-year sequence used was from 2001-2003, the same time period used in Section 7, Water Service Reliability. The normal year data was derived from data for 2005. The estimates are included in Table 4-1, below.

<b>Table 4-1</b>				
<b>Three-Year Estimated Minimum Water Supply</b>				
<b>Source</b>	<b>Year 1 -2006</b>	<b>Year 2 - 2007</b>	<b>Year 3 - 2008</b>	<b>Normal</b>
Groundwater	2,733	2,469	2,498	2,939
Imported Water	66	66	66	66
Transfers/exchanges	0	0	0	0
Recycled Water	11	11	11	11
<b>Total</b>	<b>2,810</b>	<b>2,546</b>	<b>2,575</b>	<b>3,016</b>

Based on the driest three-year historic period, the estimated minimum supply for the next three years (2006-2008) will not meet the demand for the years 2007 and 2008. The deficit of supply would be drawn from ground water in storage in the basins. Following implementation of the Recycled Water Plan in 2010, these supply deficits will be reduced.

## 4.3 Catastrophic Supply Interruption Plan

### *Water Code section 10632 (c)*

*Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.*

As part of the resolution passed on April, 2004 establishing general water use guidelines, and water shortage emergencies, the DWP Board also adopted regulations concerning non-water shortage emergencies. Non-water shortage emergencies include such emergencies as wildfires, earthquakes, terrorist acts, and any other emergencies other than drought which could affect water supply or delivery. In addition, the DWP has prepared a Water System Emergency Response Plan (February 2005) that contains procedures to be followed in the event of a declared emergency.

These regulations provide a framework for an organized response to a non-water shortage emergency. The primary objectives of these regulations is to provide guidelines and procedures for responding to emergencies, other than those related to drought, that have the potential to disrupt the DWP's ability to deliver water to its customers. All decisions associated with this resolution will be determined by the Board, when possible, the General Manager of the DWP, or his authorized representative.

All declared emergencies will be dealt with in three phases:

- The Assessment Phase
- The Emergency Phase
- The Recovery Phase

The Assessment Phase is defined as beginning upon the declaration of an emergency at the inception of the event (e.g. an earthquake) or when an event is imminent (e.g. wildfire). Upon declaration of an emergency, the following procedures shall be followed:

- DWP staff shall assess the emergency and its potential effects on the DWP's ability to provide water for human consumption, sanitation, and fire protection. This assessment should be completed within 48 hours or less. Under exceptional circumstances or changing conditions, the assessment may require additional time to complete. Nonetheless, assessment of the situation shall be completed as quickly and efficiently as possible under prevailing conditions.
- Use of water outdoors for other than emergency purposes shall be prohibited.
- Use of water indoors for purposes other than human consumption, sanitation, and fire protection shall be prohibited.
- All water use shall be minimized.

Upon completion of the Assessment Phase, the Emergency Phase shall begin and continue as long as emergency conditions persist. For the duration of the Emergency Phase, the following procedures shall be followed.

- Use of water outdoors for other than emergency purposes shall be prohibited.
- Use of water indoors for purposes other than human consumption, sanitation, and fire protection shall be prohibited.
- All water use shall be minimized.

When emergency conditions end, the Board, when possible, or General Manager shall declare an end to the Emergency Phase, which will signal the beginning of the Recovery Phase. The Recovery Phase shall last until normal conditions return to the DWP service. For the duration of the Recovery Phase, the following procedures shall be followed.

- Use of water outdoors for other than emergency purposes shall be prohibited, unless the General Manager determines that restricted outdoor water use is reasonable given the current state of DWP's water system. When restricted outdoor use is permissible, the public will be provided with a specific list of approved outdoor water uses.
- All water use shall be minimized.

When recovery is complete, water use guidelines shall return to the regulations that were in effect immediately prior to the declaration of the emergency, unless otherwise specified.

Action responses to specific types of non-drought related emergencies are outlined in the DWP's Emergency Response Plan (ERP), completed in February 2005. The ERP outlines the responses for emergencies such as earthquakes, power outages, wildfires, and so forth.

## 4.4 Prohibitions, Penalties and Consumption Reduction Methods

### *Water Code section 10632 (d-f)*

*(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.*  
*(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.* *(f) Penalties or charges for excessive use, where applicable.*

In addition to the prohibitions listed above in relation to water shortage emergencies, the DWP and City of Big Bear Lake have several general water conservation regulations that are in place at all times. These regulations are intended to conserve the available water supply and achieve an overall per capita reduction in water use.



- All structures in new developments shall be equipped with low flow faucets, showerheads and toilets. All three items must have flow rates or gallons per flush that are 2.0 gallons per minute/flush or less.
- All structures in new residential developments shall be equipped with low water use dishwashers (10 gallons/load or less) and washing machines (25 gallons/load or less).
- Residential customers in existing developments shall be encouraged to install water efficient dishwashers (10 gallons/load or less) and washing machines (25 gallons/load or less).
- All hot water lines shall be insulated.
- Customers shall be encouraged to use native and water conserving plants for landscaping.
- Customers shall be encouraged to minimize the use of turf at all new and retrofitted commercial and residential landscapes.
- The DWP shall continue development of water conservation customer outreach program.
- The DWP shall encourage and promote water recycling and reuse.
- Water conservations will be required as set forth herein.
- The DWP shall encourage and promote development of water conservation plans for all customers whose water use exceeds reasonable guidelines developed by the DWP.
- The DWP shall require repair of all leaks, once they are detected.
- No business or public place where food is sold shall serve drinking water to any person unless drinking water is specifically requested.
- All businesses and public places that offer sleeping facilities shall implement a program restricting linen changes for each guest to once every three days.
- All outdoor irrigation shall be shut off and winterized between November 1<sup>st</sup> and April 1<sup>st</sup> each year.
- Between November 1<sup>st</sup> and April 1<sup>st</sup> of each year, all homes and businesses left unoccupied for four or more consecutive days must shut off and winterize their water system.

- The DWP will establish reasonable water use standards for all residential and commercial customers in its service area. Any customer whose water use exceeds the reasonable water use established by DWP for their home or business will be requested to explain their excessive use of water to DWP staff, upon request.

In the event that the DWP must implement the water shortage emergency plan, regardless of the stage, certain mandatory prohibitions and consumption reduction methods become necessary (Table 4-2). These prohibitions and reduction methods are discussed in detail above in Section 4.1.

<b>Table 4-2 Mandatory Prohibitions and Consumption Reduction Methods</b>	
<b>Prohibitions*</b>	<b>Stage when Prohibition becomes Necessary</b>
Landscape Irrigation prohibited other than during specified hours and/or days	Stage I
No DWP for soil compaction / construction	Stage II
No new turf grass installations	Stage II
No DWP water for ponds, streams, or fountains	Stage III
No outdoor water use	Stage IV
No landscape irrigation	Stage IV
5% overall reduction in consumption	Stage I
10% overall reduction in consumption	Stage II
25% overall reduction in consumption	Stage III
45% overall reduction in consumption	Stage IV

\* some examples of prohibitions. See 4.1 for more detailed information.

As part of the resolution passed on April, 2004 establishing general water use guidelines, and water shortage emergencies, the DWP Board also adopted regulations concerning the penalties and charges for failure to comply with the resolution adopted. These penalties and charges are outlined in Table 4-3 below, and further discussed in detail below. Per the resolution, they are intended to apply to all the water conservation regulations, not just those implemented in a water shortage emergency.

<b>Table 4-3 Penalties and Charges</b>		
<b>Violation</b>	<b>Penalty or Charge</b>	<b>Stage when penalty takes effect</b>
First Violation	Notification	All Conservations Stages
Second Violation	Notification + \$50 surcharge	All Conservations Stages
Third Violation	Notification + \$250 surcharge + report to Board	All Conservations Stages

<b>Table 4-3 (Continued) Penalties and Charges</b>		
<b>Violation</b>	<b>Penalty or Charge</b>	<b>Stage when penalty takes effect</b>
Fourth Violation	Notification + \$500 surcharge and related expenses + flow restrictor on water service + report to Board	All Conservations Stages
Fifth Violation	Notification + Discontinuation of Water Service + agreement to comply	All Conservations Stages

The penalties for failure to comply with any of the provisions of Resolution No. DWP 2004-03 are as follows:

- **First Violation.** The DWP will contact the violator by certified mail explaining the violation, the need for regulation that was violated, a list of penalties associated with continued violation, and request voluntary compliance.
- **Second Violation.** The DWP will contact the violator by certified mail explaining the violation, the need for regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, and add a \$50 surcharge to the customer's water bill.
- **Third Violation.** The DWP will contact the violator by certified mail explaining the violation, the need for regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violations, add a \$250 surcharge to the customer's water bill, and notify the Board.
- **Fourth Violation.** The DWP will contact the violator by certified mail explaining the violation, the need for regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violations, install a flow restrictor in the customer's water service, add a \$500 surcharge and all associated expenses to the customer's water bill, and notify the Board.
- **Fifth Violation.** The DWP will contact the violator by certified mail explaining the violation, the need for regulation that was violated, inform the customer of his previous violations, and, upon approval of the Board, discontinue water service to the customer until the customer delivers a notarized written agreement to abide by all water use regulations established by DWP and such other requirements as the Board may determine to be appropriate under the circumstances.

The resolution also includes provisions for the removal of the flow restrictor and/or the restoration of water service upon a Hearing held where the customer demonstrates to the satisfaction of the DWP General Manager that the causes of the violations have been corrected and all fines, fees and surcharges have been paid.

## 4.5 Analysis of Revenue Impacts of Reduced Sales During Shortages

### *Water Code Section 10632(g)*

*An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f) inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.*

The projected impact of water sales for each one year period during a water shortage condition would result in an overall decrease in water sales revenue approximately equal to the reduced consumption required by the respective conservation stage. Should a Stage I water shortage emergency be in place for one year, the DWP could expect a revenue decrease of about 5%, equal to a 5% decrease in consumption.

In 2005, the DWP instituted a Reserve Fund Policy, with the purpose of reserving a portion of the budget each year to overcome revenue impacts as a result of water shortage emergencies, or natural or other disasters, or other emergency capital outlay problems.

Starting in 2005, a total of one month of costs for the daily operations of the DWP will be held in reserve as part of the Policy. Each year, the DWP will add one additional month as part of the Reserve Fund Policy until a total of three months of operating surplus is set aside.

In addition to the reserves of operating costs, the DWP Reserve Fund Policy also states that a reserve of capital replacement is targeted to be maintained. The DWP currently is saving to secure a reserve of the capital costs to replace 75% of one DWP production well, and 75% of the cost to replace one DWP 1 million gallon water storage reservoir.

Based on this Reserve Fund Policy, adequate reserves are presently in place (8.3% yearly operating costs) to cover a present Conservation Stage I or Stage II for one year. In 2010, the DWP will have adequate reserves in place to cover a Conservation Stage III for one year. However, in the event of a long term implementation (more than one year) of Conservation Stages III or IV, a water rate increase would be necessary to help overcome the reduction in water sales revenue and to prevent depletion of the reserve funds. As part of the Financial Plan and Rate Study currently being performed by the DWP as part of the Water Master Plan, a rate adjustment is being studied due to the potential revenue impacts of water conservation.

## 4.6 Draft Ordinance and Use Monitoring Procedure

### *Water Code 10632 (h & j)*

*(h) A draft water shortage contingency resolution and ordinance.*

*(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.*

DWP's water shortage resolution was discussed in Section 4, and a copy of the resolution and the plan are attached in Appendix B.

If the water savings actions contained within the resolution are ever necessitated by water shortage conditions, DWP will be able to track actual reductions in water use through its billing system. The billing system tracks actual use on a monthly or bimonthly basis regardless of the supply condition. DWP can readily compare past consumption records with current consumption records to determine actual water reductions during water shortages.

# Section 5

## Recycled Water Master Plan

### 5.1 Agency Coordination

In 2004 and 2005, the Big Bear Area Regional Wastewater Agency (BBARWA), working along with the City of Big Bear Lake Department of Water and Power (DWP), and the Big Bear Lake City Community Services District (CSD), cooperated in the preparation of a Draft Recycled Water Master Plan for the Big Bear Valley, which has yet to be finalized. BBARWA, which provides wastewater management to the Big Bear Valley (Valley) decided that they needed to seek to expand its use of effluent from its wastewater treatment plant to produce recycled water within the Valley. The Master Plan, whose implementation will result in benefits to all three agencies, includes: reduction of the Valley's dependence on limited groundwater supplies, extension of available water resources, and provision of valuable economic and environmental benefits to the Valley's communities.

Table 5-1 Participating Agencies	
Participating Agencies	Role in Plan Development
City of Big Bear Lake Department of Water and Power	-Provided information as needed during development of the Plan -Identified potential recycled water users within their service area
Big Bear City Community Services District	-Provided information as needed during development of the Plan -Identified potential recycled water users within their service area
Big Bear Area Regional Wastewater Agency	-Prepared the Recycled Water Master Plan -Contributed funding to the development of the Plan -Leading the way in funding and implementing the recommendations of the Recycled Water Master Plan

The objectives of the Recycled Water Master Plan are to investigate the feasibility of using recycled water throughout the Big Bear Valley. It provides a comprehensive planning document that outlines a phased road map for incremental implementation of facilities to achieve the listed benefits. In order to evaluate the potential for water recycling, the Master Plan included these key activities:

- Market Assessment
- Supply Evaluation
- Demand Evaluation
- Facilities Analysis
- Cost Analysis

These activities were used to develop a phased approach to implementation of a recycled water program. The user implementation of the Plan was divided into 8 phases, because of the distinct geographic areas where the users located. Some phases cannot happen until earlier phases are implemented, while other phases could be implemented in random order after Phase 1 is implemented. The recycled water supply implementation is divided into 4 improvement phases at the wastewater treatment plant, each phase in 500 acre-foot increments.

## 5.2 Wastewater Collection and Treatment System

Wastewater collection systems within the service area for DWP are not operated by the DWP, but by the City of Big Bear Lake, the Big Bear City Community Services District, and the County of San Bernardino County Service Area 53B. These collection systems deliver wastewater to BBARWA's interceptor system for transport to the Regional Wastewater Plant (WWTP). The BBARWA was formed in March 1974, and its service area includes the entire 79,000 acres of the Big Bear Valley. The BBARWA operates 3 main lines; the LPS force main that services the City of Big Bear Lake's wastewater system, the North Shore Interceptor that services the county's wastewater system, and the BBARWA Trunk Line that services the CSD's wastewater system and conveys flow from the North Shore Interceptor to the treatment Plant. The wastewater flows from the three main lines and is conveyed to the BBARWA WWTP located at Baldwin Lake.

The BBARWA system is composed of a 4.89 mgd secondary wastewater treatment plant, 14.6 miles of sewer pipeline, and 1.5 miles of existing recycled water pipeline. The average daily flow treated by BBARWA WWTP is approximately 2.2 mgd. The BBARWA Regional Wastewater Treatment Plant provides secondary treatment of influent, which consists of the following:

- Preliminary Treatment – Consisting of screening of solids with bar screens, grit removal, and landfill disposal of solids.
- Secondary Biological Treatment – Consisting of oxidation ditches using mechanical aeration, achieving organic material stabilization, nutrient removal via “symbio” process and pathogen reduction.
- Secondary Sedimentation Treatment – Consisting of solids settlement in clarifiers, pumping of waste activated sludge (WAS) to a dissolved air floatation system, and returning activated sludge to the oxidation ditches.
- WAS Thickening – Consisting of a DAF system that skims sludge for sludge dewatering, using a belt filter press and a system that pumps the filtrate to the oxidation ditches.

- Sludge Dewatering – Consisting of a belt filter press or sand / asphalt drying beds that produces belt filter cake for disposal and return filtrate to the oxidation ditches.
- Sludge Disposal – The dewatered solids are hauled to either Nursery Products composting facility in Adelanto, the Synagro composting facility in Corona, or incinerated at the Mitsubishi cement plant in the Lucerne Valley. The Nursery Products and Synagro plants compost the solids to produce commercially available compost. The Mitsubishi cement plant burns the solids in their kilns to reduce harmful NOx emissions from their smokestacks.
- Water Reclamation – Effluent from the plant is used for irrigation, construction, and wildlands fire-fighting purposes. Recycled water is stored on site in either a storage tank or an existing unused chlorine contact chamber.

Secondary Effluent quality is summarized in the following table, using annual data from the year 2003.

<b>Table 5-2 Secondary Effluent Quality</b>			
<b>Parameters</b>	<b>Units</b>	<b>Values</b>	<b>Secondary Effluent Discharge Requirements</b>
Flow	mgd	2.2	-
pH	SU	7.4 – 8.3	6.5 - 8.5
Conductivity	Umhos	725	-
BOD	mg/l	8.0	30
TSS	mg/l	7.1	30
TDS	mg/l	419	520
Chloride	mg/l	47	60
Sodium	mg/l	65	-
Manganese	mg/l	<0.02	-
Iron	mg/l	<0.1	-
Total Inorganic Nitrogen	mg/l	3.8	10
Total Phosphorus	mg/l	1.5	-
Sulfate	mg/l	41	60

The water discharged from the WWTP fulfills the requirements of Secondary Effluent. None of the wastewater treated by the WWTP is currently discharged or treated to recycled water standards.

<b>Table 5-3 Wastewater Collected and Treated – AF/Y</b>						
	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Wastewater collected and treated in service area	3,432	2,766	2,700	2,700	2,750	2,750
Quantity that meets recycled water standard	0	0	0	0	0	0



Table 5-3 represents the quantity of wastewater collected and treated in the past and projected into the future. The year 2000 was a year with higher than normal precipitation, resulting in a higher quantity of wastewater treated. The average annual flow to the treatment plant is approximately 2,766 acre-feet. BBARWA examined the historical wastewater flow data, as well as projected data in their Recycled Water Master Plan and saw no apparent justification for an increase in wastewater flow in the future. They estimate that wastewater flows will show a downward trend in the future. They cite such factors as reduced infiltration and inflow, and new plumbing codes that mandate low flow fixtures for new construction, and retrofit programs for replacement of existing fixtures.

### 5.3 Disposal of Non-Recycled Wastewater

The table below shows the disposal of non-recycled wastewater from the WWTP. Presently, the vast majority of the water, 99.6%, is discharged to a 480 acre site in the Lucerne Valley, where it is used to irrigate alfalfa fields. A small portion, 11 acre-feet, is further treated and under three California Regional Water Quality Control Board WDR permits, provided to 139 user accounts of various types, such as irrigation and construction water.

Table 5-4 Disposal of Wastewater (Non-Recycled) – AF/Y						
Method of Disposal	Treatment Level	2005	2010	2015	2020	2025
Discharge to Lucerne Valley	Secondary	2,755	2,755	2,100	2,100	1,475

This table also assumes that the Recycled Water Master Plan is implemented as written, with the first stage of construction completed in 2010, and Stage 2 completed in 2014. Each phase will increase the recycled water produced by the WWTP by 500 acre-feet per year, thereby reducing the disposal of non-recycled wastewater by approximately 625 acre-feet per stage.

### 5.4 Current Recycled Water Uses

Presently, the BBARWA treats a small quantity of water under three RWQCB permits to Title 22 standards at the WWTP from an existing pilot MF and RO system. Up to 0.4 MG of tertiary water is stored at the plant for distribution. This water is provided to 139 users of various types. The table below outlines those uses.

<b>Table 5-5 Current Recycled Water Use</b>		
<b>Type of Use</b>	<b>Treatment Level</b>	<b>2005 AF/Y</b>
Agriculture	Recycled Water	0
Landscape	Recycled Water	1.32
Wildlife Habitat	Recycled Water	0
Wetlands	Recycled Water	0
Industrial	Recycled Water	0
Groundwater Recharge	Recycled Water	0
Construction	Recycled Water	9.68
Other	Recycled Water	0
<b>Total</b>	<b>---</b>	<b>11.0</b>

Irrigation users comprise the largest number of accounts, but use significantly smaller amounts of water than construction uses. Irrigation use currently is permitted via a Valley-wide permit, where recycled water is delivered to individual homeowners and distributed from on-site holding tanks by the individual property owners. Construction use for dust control and soil compaction is delivered to the contractors at the BBARWA facility for use at various construction sites. During the recent drought, an ordinance restricting the use of potable water for dust control provided incentive for contractors to use recycled water on their construction sites.

## 5.5 Potential Recycled Water Uses

BBARWA's Recycled Water Master Plan has identified numerous opportunities for recycled wastewater (Table 5-6). Although these opportunities are listed in the Master Plan, the emphasis of the Plan is the use of recycled water for groundwater recharge.

<b>Table 5-6 Potential Recycled Water Uses –AF/Y</b>					
<b>Type of Use</b>	<b>Treatment Level</b>	<b>2010*</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Agriculture	Title 22	0	0	0	0
Landscape	Title 22	0	440	440	440
Wildlife Habitat	Title 22	0	49	49	49
Wetlands	Title 22	0	66	66	66
Industrial	Title 22	0	600	600	600
Groundwater Recharge	Title 22	0	1,000	1,000	1,000
Other	Title 22	0			
<b>Total</b>	<b>---</b>	<b>0</b>	<b>2,155</b>	<b>2,155</b>	<b>2,155</b>

\* Recycled Water not scheduled to be available until 2011

Once the infrastructure required for groundwater recharge is in place, the Recycled Water Master Plan calls for the phasing in of other potential recycled water customers. This will occur as funds become available.

## Section 6

# Water Quality Impacts on Reliability

Potable water supplies within the DWP's service area are derived primarily from local groundwater, with a small amount of imported water from CLAWA. In the future, recycled water will provide a significant portion of the potable supplies.

Contamination of these sources or more stringent regulatory requirements has the potential to result in adjustments to water resource management strategies and, in the worse case scenario, impact supply reliability. As opposed to most water districts, DWP does not have the option of blending the local ground water supplies with the imported supplies, since the imported water is delivered to a service area that is not connected to the rest of the DWP's service area, and delivered in quantities that will not mitigate water quality impacts to the ground water. The ground water itself is blended in the system to help mitigate against water quality impacts.

California Title 22 Drinking Water Standards (Title 22) incorporates the federal requirements of the Safe Drinking Water Act, and compliance with Title 22 is required by all water service providers. Therefore, Title 22 Monitoring of all regulated chemicals as well as a number of unregulated chemicals is conducted by the DWP. In order to be in compliance with Title 22, they must ensure that the regulated chemicals meet established primary drinking water standards to ensure the safety of the water supply. In addition to the primary drinking water standards, secondary drinking water standards have been set for some minerals based on non- health related aesthetics, such as taste and odor. Both primary and secondary standards are expressed as the maximum contaminated levels (MCL) that are allowable for a given constituent. Unregulated chemicals do not have established drinking water standards, but are chemicals of concern for which standards may be eventually adopted. These unregulated chemicals often have a "notification level", which is a health based advisory level established by Department of Health Services for chemicals in drinking water that lack MCLs.

Three wells out of the fifty-five wells in the DWP system presently have water quality issues that need to be addressed. The Pennsylvania well presently has high levels of manganese, which is presently being treated via Ion Exchange treatment plant at the well head. The Knickerbocker well has levels of arsenic that exceed the 2006 MCL (but not prior to 2006), and has been taken out of service. The DWP is actively pursuing the installation of Ion Exchange well head treatment at the Knickerbocker well to address these arsenic levels, and allow the well to be put back into service. The Monte Vista well presently exceeds Flouride MCL levels, but is blended with the Onyz well to bring Flouride level into compliance. There is also concern about fluoride levels at several other wells in a few subunits in the system, but these levels are not near regulatory levels.

In the past, the DWP has built, or is planning to build, well head treatment to address any water quality impacts at the wells. The DWP cannot afford to lose any wells to water quality, and is committed to bringing treatment online to deal with water quality issues as they arise.

# Section 7

## Water Service Reliability

### 7.1 Introduction

The implementation of the water projects included in this UWMP, namely the Recycled Water Plan will help ensure that the DWP will be able to meet projected water demands.

As discussed earlier, almost 100% of the DWP's water supplies are groundwater, with a very small percentage being imported water to supply a distant portion of the service area.

### 7.2 Projected Normal Year Supply and Demand Comparison

The tables below (Tables 7-1 and 7-2) project the total supplies and total demands for the DWP under average conditions, in five year intervals through 2025. Under normal conditions, it is expected that the present groundwater supply is adequate to meet demands through 2011, when the Recycled Water project is anticipated to come online. Stage 1 of the Recycled Water Project is projected to come online in 2011, and projected to provide 500 acre-feet of supply, as groundwater recharge. Stage 2 is projected to come online in 2014, providing an additional 500 acre-feet of supply starting in 2015, for a total of 1,000 acre-feet.

In January 2005, the DWP prepared an update of the perennial yield of the groundwater basins, and determined the maximum perennial yield to be 3,400 to 3,475 acre-feet per year under normal conditions. Under normal conditions, the maximum perennial yield as well as recycled water, should meet the demand out to 2025.

Table 7-1 Projected Normal Water Year Supply – AF/Y				
Supply	2010	2015	2020	2025
Groundwater	2,895	2,318	2,541	2,863
Recycled Water	0	1000	1000	1000
% of Normal	100%	100%	100%	100%

Table 7-2 Projected Normal Water Year Demand – AF/Y				
	2010	2015	2020	2025
Demand	2,757	3,065	3,372	3,679
Unaccounted for water (5%)	138	153	169	184
Total	2,895	3,318	3,541	3,863
% of 2005	113%	129%	138%	150%

<b>Table 7-3 Projected Normal Year Supply and Demand Comparison – AF/Y</b>				
	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Supply total	2,895	3,318	3,541	3,863
Demand total	2,895	3,318	3,541	3,863
Difference (S-D)	0	0	0	0
Diff. as % Supply	0%	0%	0%	0%
Diff. as % of Demand	0%	0%	0%	0%

### 7.3 Projected Single Dry Year Supply and Demand Comparison

Using 2002 to represent the single-dry year, projections of water demand were compared to projected supplies for the period 2010 to 2025 in the tables below. This information is based on continued commitment to conservation programs and the use of recycled water as groundwater recharge beginning in 2011.

The vast majority (98%) of the present water supply from the DWP consists of groundwater pumped from several hydrologic subunits within the Big Bear Valley. In the event of single and multiple dry years, the lower rainfall results in lower recharge in the subunits. Since the subunits contain more water in storage than the perennial yield, there is water available despite lower recharge. The lower recharge simply results in lower water levels in the wells. This causes decreases in the production capacity of each well; the pumps will have to pump against a larger total dynamic head due to the increased distance from the water level to the surface. When pumps operate against a larger total dynamic head than they were designed for, the total flow from the pump and the efficiency of the pump decreases from the design values. The decreased total flow from the well can be recovered by pumping for a longer time to achieve the same volume of water. In the case of a well that pumps constantly, the total volume from the well will be reduced. When considering the entire system, an overall lowering of capacity can be expected.

During the drought from 2001 to 2003, the DWP experienced a decrease in the well production capacity throughout their system. This reduction ranged from 97% of the perennial yield in 2001, 93% in 2002, 84% in 2003, to 85% in 2004. There were a few years of lower than average rainfall prior to 2001, and 2004 was a lower than average year as well. A total production rate in gallons per minute (gpm) was also measured in the Big Four portion of the service area in the first week in April each year during this drought. The reduction in total capacity of the wells ranged as low as 65% of the production at the same time of the year in 2005 (above average rainfall).

For purposes of the UWMP, 2002 was considered the single dry year based on the low rainfall that year. But, since 2002 was near the start of the drought, the largest impacts of the drought on the water levels were not seen until 2003. The 84% reduction in well production capacity from perennial yield was used to estimate the projected single dry year water supply in five year increments through 2025 (Table 7-4).

<b>Table 7-4 Projected Single Dry Year Water Supply – AF/Y</b>				
<b>Supply</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Groundwater	2,460	2,460	2,460	2,460
Imported water	66	66	66	66
Recycled Water	0	1000	1000	1000
Totals	2,526	3,526	3,526	3,526
% of Normal	87%	106%	99%	91%

<b>Table 7-5 Projected Single Dry Year Water Demand – AF/Y</b>				
	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Demand	3,062	3,318	3,541	3,863
% of 2005	119%	129%	137%	150%

<b>Table 7-6 Projected Single Dry Year Supply and Demand Comparison – AF/Y</b>				
	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Supply total	2,526	3,526	3,526	3,526
Demand total	3,062	3,318	3,541	3,863
Difference (S-D)	-536	208	-15	-337
Diff. as % Supply	21%	6%	0.4%	9%
Diff. as % of Demand	18%	6%	0.4%	9%

Any individual year between 2005 and 2025 that receives the equivalent rainfall to the single-dry year, and sees a reduction in well production capacity that is equivalent, will likely encounter shortages in supply, which could be made up with conservation, or groundwater in storage. Once recycled water is available, anticipated for 2011, the additional supply will cover shortages in groundwater due to a single-dry year. The availability of recycled water is not affected by weather patterns since the projected quantity of water to be recycled represents less than half the quantity treated on a yearly basis.

## 7.4 Projected Multiple Dry Year Supply and Demand Comparison

To determine the reliability of DWP's supplies under a multi-year drought scenario, the 2001-2003 drought period was used as a hydrologic base years to obtain supply and demand forecasts in five year intervals (Table 7-7). Each five-year increment (e.g. 2006-2010) assumes the same multiple dry year period condition, and uses the 2003 figures for the remaining two years of each five year increment.

Table 7-7 shows the supply for years 2006-2010, 2011-2015, 2016-2020, and 2021-2025 based on the calculations described above under single-dry year. The reduction in well production capacity experienced throughout the multiple dry year period was applied to each five year increment.

<b>Table 7-7</b> <b>Projected Supply and Demand Comparison During Multiple Dry Year Period</b>								
Demand (AF)				Supply				
Year	Demand	Un-accounted for water	Total Demand	Groundwater	Recycled Water	Total Supply	Difference (S-D)	% of Supply
2006	2511	126	2637	2733	0	2733	97	4%
2007	2573	129	2702	2469	0	2469	-233	-9%
2008	2634	132	2766	2498	0	2498	-268	-11%
2009	2696	135	2831	2498	0	2498	-333	-13%
2010	2757	138	2895	2498	0	2498	-397	-16%
2011	2819	141	2960	2733	500	3233	273	8%
2012	2880	144	3024	2469	500	2969	-55	-2%
2013	2942	147	3089	2498	500	2998	-91	-3%
2014	3003	150	3153	2498	500	2998	-155	-5%
2015	3065	153	3218	2498	1000	3498	280	8%
2016	3126	156	3282	2733	1000	3733	451	12%
2017	3187	159	3346	2469	1000	3469	122	4%
2018	3249	162	3411	2498	1000	3498	87	2%
2019	3310	166	3476	2498	1000	3498	23	1%
2020	3372	169	3541	2498	1000	3498	-42	-1%
2021	3433	172	3605	2733	1000	3733	129	3%
2022	3495	175	3670	2469	1000	3469	-201	-6%
2023	3556	178	3734	2498	1000	3498	-236	-7%
2024	3618	181	3799	2498	1000	3498	-301	-9%
2025	3679	184	3863	2498	1000	3498	-365	-10%

Starting in 2011, Stage 1 of the Recycled Water Project is anticipated to be complete, supplying 500 acre-feet of recycled water. Starting in 2015, Stage 2 recycled water is anticipated to be available, providing additional 500 acre-feet of water supply for a total of 1,000 acre-feet.

During these multi-year dry periods, the reduction in water production capacity results in insufficient supply to meet demand. This is particularly the case in 2006 through 2010 before recycled water is anticipated to be available. Also, in the years 2021 through 2025, with the additional recycled water available, there will be shortfalls in supply. These shortfalls are relatively minor, averaging around 10% percent, and could be overcome by instituting water conservation measures, or by additional pumping from the basins, tapping the storage capacity of the aquifers and further dropping the water levels in some basins. In the event of a multi-year drought, it is likely that the Water Shortage Emergency Plan would be implemented, resulting in a reduction in water demand ranging from 5% to 45%, depending on which stage of the Plan is implemented.

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**RESOLUTION NO. DWP 2004-03**

**A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE  
DEPARTMENT OF WATER & POWER OF THE CITY OF BIG BEAR LAKE,  
COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA**

**DECLARATION OF THE NEED FOR UPDATING GENERAL WATER  
CONSERVATION GUIDELINES, ADOPTION OF REGULATIONS FOR NON-  
WATER SHORTAGE EMERGENCIES, AND ADOPTION OF REGULATIONS  
FOR WATER SHORTAGE EMERGENCIES IN THE BIG BEAR VALLEY**

**THIS RESOLUTION SUPERSEDES DWP REGULATION NO. 1 ADOPTED  
JUNE 18, 1989, AND SECTION 3 OF RESOLUTION NO. DWP 2003-05  
ADOPTED NOVEMBER 7, 2003**

WHEREAS, the Department of Water & Power, City of Big Bear Lake ("DWP") has the duty to supply existing customers with water; including, most importantly, water for human consumption, sanitation, and fire protection, and

WHEREAS, the water resources of DWP, which consist entirely of ground water, are limited, and

WHEREAS, the ground water basins within DWP's service area ("ground water basins") are only recharged from rain and snow and the resulting percolation, and

WHEREAS, Big Bear Valley exists in a climate where periodic droughts will continue to occur and aquifer recharge can be minimal for several consecutive years, and

WHEREAS, water usage and demand by DWP customers has substantially increased over the past ten years, especially outdoor usage, and

WHEREAS, the estimate of perennial yield of the aquifers, water usage by customers, and anticipated growth of the community indicate that water demand may exceed supply within the next ten years; and

WHEREAS, a water shortage emergency has already been declared and currently exists within the Big Bear Valley.

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of the DWP, City of Big Bear Lake, as follows:

## **ARTICLE WCR: GENERAL WATER CONSERVATION REGULATIONS**

### **Section WCR 1. Purpose.**

The purpose of this resolution is to set forth and require compliance with water conservation measures to maximize the benefit of existing water supplies for the citizens of, visitors to, and the economic well-being of the Big Bear Valley. The Board of Commissioners of the DWP finds that these measures will significantly reduce wasteful and inefficient consumption of water, and thus make these water resources available for human consumption, sanitation, and fire protection, while reducing hardship to residents of and visitors to the Big Bear Valley.

### **Section WCR 2.A. Application.**

The provisions of this resolution shall apply to all DWP customers, including customers who may also take groundwater from wells not owned or operated by the DWP.

### **Section WCR 2.B. Exception.**

The prohibitions contained in this resolution shall not apply to the use of water necessary for human consumption, sanitation, fire protection, or essential government services.

### **Section WCR 3. Goals and Objectives.**

Due to the increasing demand for water by DWP customers, and the finite nature of the Big Bear Valley's water resources, the general welfare of the community is best served by using the available water supply for maximum beneficial uses. Wasteful, inefficient, and unreasonable uses of water must be prevented.

Therefore, the DWP hereby declares and establishes the following goals and objectives pertaining to the use of water provided by DWP:

#### **A. Goals**

1. The efficient use and distribution of the available water.
2. Conservation of limited water resources.
3. Utilization of the water supply for the greatest public benefit, with particular regard for human consumption, sanitation, and fire protection.

#### **B. Objectives**

1. To conserve the available water supply.
2. To achieve an overall, per capita reduction in water use.
3. To eliminate inefficient use of water.
4. To reduce the volume of water waste.

5. To increase consumer awareness about the need for and benefits of water conservation.
6. To ensure an adequate supply of water to meet the reasonable needs of all users of DWP water.
7. To minimize water loss from the DWP water system.
8. To require all new and encourage all existing developments to be equipped with water conserving devices, fixtures, and appliances.
9. To increase the use and installation of water conserving plants and landscapes.
10. To encourage all new and existing developments to install landscape elements and erosion control devices that encourage groundwater recharge.

#### **Section WCR 4. DEFINITIONS.**

The following words and phrases, whenever used in this article, shall be construed as defined in this section, unless otherwise specified within individual sections of this article.

Adequate and sufficient water supply. A water supply that is sufficient to meet all reasonable needs of the community for the foreseeable future.

Agricultural well. Any water well used to supply water specifically for irrigation or other agricultural purposes.

All DWP customers. All persons, residences, businesses, and entities who receive and/or use water provided by DWP.

Aquifer. A permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients.

Board. DWP Board of Commissioners.

Drought. A series of years where precipitation is below average.

Erosion control. Anything that inhibits erosion.

Essential government services. Services provided by any form of government that contributes towards the greater well-being of the community and has been approved by its constituents.

Existing developments. Developments for which certificates of occupancy have been granted.

Finite. Limited in quantity.

Fire protection. Water needed to protect humans and their property from an active fire.

Greatest public benefit. Anything that is most beneficial, in the long-run, to the majority of the community.

Groundwater. Any water that comes from springs or wells.

Groundwater basin. Any area that is defined by natural topography such that all surface and subsurface water, due to the forces of gravity, has the potential to move in a common direction or pool in a common area.

Hardscape. A landscape feature that contains no vegetation. Examples include walkways, decks, graveled areas, areas covered with mulches, etc.

Hardship. Sacrifices beyond the norm which are necessary to live, work, and play under the given circumstances.

His. A collective term independent of gender and may refer to male or female.

Human consumption. Water directly consumed by humans and their pets or livestock.

Individual domestic well. Any water well used to supply water for the domestic needs of an individual residence or systems of four or fewer service connections.

Inefficient. Using water in a quantity in excess of the amount needed to accomplish a given task.

Landscape. All portions of a property that are not covered by the foundations of buildings or other structures.

Landscape element. Any and all unique features of a landscape.

Landscaping. The process of adding or subtracting vegetation or non-vegetative materials or their support structures (irrigation systems, walkways, retaining walls, etc.) to a landscape.

Limited. A substance without endless supply.

Low flow. Any water fixture that meets or exceeds current low flow standards for that item.

Maximize the benefit. To obtain the greatest feasible benefit.

Native plant. A plant indigenous to the San Bernardino Mountains; specifically, indigenous plants that require little or no irrigation to survive.

New developments. Developments that are under construction or will be constructed in the near future, and for which certificates of occupancy have not been granted.

Non-water shortage emergencies. Any emergency that has the potential to adversely affect DWP's water system, water supply or water service, which is not directly related

to actual or potential water shortages caused by extended periods of below average rainfall (i.e. drought).

Per capita. On average for each member of the community, whose numbers may change over time.

Percolation. Movement of water, by the forces of gravity, through soils and bedrock to a point of greater depth than its previous location.

Perennial yield. The maximum quantity of water available on an annual basis for the foreseeable future. This quantity depends on the amount of water economically, legally, and politically available to the organization(s) managing the ground water basin.

Periodic drought. Droughts that occur at regular or irregular intervals.

Practical and reasonable. An activity that achieves a desired goal and can be performed by an average person.

Precipitation. Water, in all its forms, that falls from clouds onto the surface of the earth.

Recharge. The process of adding water to an aquifer.

Recycle. To use for the same purpose multiple times.

Retrofit. Any change to an existing element.

Reuse. To use more than once; typically, multiple times.

Sanitation. Cleanliness or the disposal of unhealthful waste.

Technical Review Team (TRT). A team of, at minimum, five individuals that will be comprised of Board members, DWP management staff, and one hydrogeologist or engineering consultant. Additional individuals may be added to the TRT when any circumstance arises that requires specialized or additional expertise.

Wasteful. Using water in a quantity in excess of the amount needed to accomplish a given task.

Water conservation plan. A plan developed for any property that provides recommendations for conserving water based on how the home or business occupying the property used water in the past.

Water conserving landscapes. Landscapes that require little water to remain in good condition.

Water conserving plants. Plants that require little water to remain in good condition.

Water conservation. Practices or activities which result in the use of water efficiently and in quantities considered less than average.

Water loss. The unaccounted-for disappearance of water.

Water resources. The retrievable and usable supply of water.

Water shortage emergency. An emergency that is caused by extended periods of below average precipitation (i.e. drought).

Water usage. The act of using water provided by the DWP water system.

Winterize. Turning off the water service and draining the on-site pipes or plumbing to prevent damage to the system during the winter months due to freezing.

Xeriscape. A landscape that requires relatively little water to install and maintain. Qualifying landscapes include those that range from highly vegetated to completely lacking in vegetation.

**Section WCR 5. Water Use Policies and Requirements.**

- A. All structures in new developments shall be equipped with low flow faucets, showerheads, and toilets. All three items must have flow rates or gallons per flush that are 2.0 gallons per minute/flush or less.
- B. All structures in new residential developments shall be equipped with low water use dishwashers (10 gallons/load or less) and washing machines (25 gallons/load or less).
- C. Residential customers in existing developments shall be encouraged to install water efficient dishwashers (10 gallons/load or less) and washing machines (25 gallons/load or less) upon replacement.
- D. All hot water lines shall be insulated.
- E. Customers shall be encouraged to use native and water conserving plants for landscaping.
- F. Customers shall be encouraged to minimize the use of turf at all new and retrofitted commercial and residential landscapes.
- G. The DWP shall continue development of the water conservation customer outreach program.
- H. The DWP shall encourage and promote water recycling and reuse.
- I. Water conservation will be required as set forth herein.
- J. The DWP shall encourage and promote development of water conservation plans for all customers whose water use exceeds reasonable guidelines developed by the DWP.
- K. The DWP shall require repair of all leaks, once they are detected.

- L. No business or public place where food is sold shall serve drinking water to any person unless drinking water is specifically requested.
- M. All businesses and public places that offer sleeping facilities shall implement a program restricting linen changes for each guest to once every three days.
- N. All outdoor irrigation systems shall be shut off and winterized between November 1<sup>st</sup> and April 1<sup>st</sup> each year.
- O. Between November 1<sup>st</sup> and April 1<sup>st</sup> of each year, all homes and businesses left unoccupied for four or more consecutive days must shut off and winterize their water system.
- P. The DWP will establish reasonable water use standards for all residential and commercial customers in its service area. Any customer whose water use exceeds the reasonable water use established by DWP for their home or business will be requested to explain their excessive use of water to DWP staff, upon request.

**Section WCR 6.A. Definition of “essential” water use.**

The term **essential** water use is defined to mean water necessary for human consumption, sanitation, and fire protection. All other uses of water that are not specifically required to meet these needs shall be considered **nonessential**.

**Section WCR 6.B. Examples of “nonessential” water use.**

This list should not be considered all-inclusive, but simply a guide for the most common forms of nonessential water use.

- A. Washing sidewalks, porches, driveways, hard-scapes, etc.
- B. Water for fountains, ponds, streams, and swimming pools.
- C. Water for noncommercial washing of vehicles.
- D. Water for commercial car washes.
- E. Water for landscape irrigation.
- F. Irrigation water runoff and flooding street gutters.
- G. Using water from hydrants for uses other than fire protection.



#### **Section WCR 7. Administration & Emergencies.**

- A. The General Manager of DWP shall be responsible for enforcement of the provisions of this resolution.
- B. Emergencies can be declared and emergency regulations can only be adopted by a majority vote of the DWP Board unless such a vote cannot be obtained or emergency conditions require immediate action. Under these conditions, the General Manager of the DWP, or his authorized representative, shall be authorized to declare a water emergency and implement such water conservation measures as he deems appropriate under the circumstances.
- C. The General Manager shall likewise be authorized to grant administrative relief from any provision of this resolution, as the General Manager deems appropriate under the circumstances.

#### **Section WCR 8. Technical Review Team (TRT).**

The TRT shall review and evaluate the status, condition, and availability of DWP's ground water supplies and recommend and advise the Board concerning Conservation Stages and other significant resource management constraints including placing limits on new service connections. To that end, the TRT will convene a minimum of twice during the year. The first such meeting will be conducted no later than April, to consider the state of the water supply prior to the summer high use period, and the second such meeting will be convened in October, to evaluate impacts on supplies of the summer pumping period and compare annual well production to available perennial yield. The TRT will meet no later than the week before the April Board meeting to perform its evaluation, and will then make a report to the Board with their recommendations not later than the April Board Meeting. Whenever the Board adopts Conservation Stage III, the TRT will meet at least monthly, from May through October, to monitor the state of the DWP's water supply. As a result of these additional meetings, the TRT might recommend that the Board impose more or less stringent water use regulations depending upon customer response, well production, and ground water levels.

#### **Section WCR 9. Failure to Comply.**

The penalties for failure to comply with any of the provisions of this article shall be as follows:

- A. First violation. The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, a list of penalties associated with continued violation, and request voluntary compliance.
- B. Second violation. The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, and add a \$50 surcharge to the customer's water bill.
- C. Third violation. The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of

his previous violations, provide a list of penalties associated with continued violation, add a \$250 surcharge to the customer's water bill, and notify the Board.

- D. Fourth violation. The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, install a flow restrictor in the customer's water service, add a \$500 surcharge and all associated expenses to the customer's water bill, and notify the Board.
- E. Fifth violation. The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, and, upon approval of the Board, discontinue water service to the customer until the customer delivers a notarized written agreement to abide by all water use regulations established by DWP and such other requirements as the Board may determine to be appropriate under the circumstances.

#### **Section WCR 10. Removal of the Flow Restrictor.**

The water restrictor will be removed, or water service will be restored, as the case may be, upon a Hearing as provided below where the customer demonstrates to the satisfaction of the General Manager that the cause of the violation has been corrected and that all fines, fees, and surcharges have been paid.

#### **Section WCR 11. Appeal Process.**

A customer shall have the right to a hearing before the General Manager if the DWP receives a written request for such a hearing on or before twenty-one (21) days after the date the notice is mailed to the customer.

The written request for a hearing shall include a statement setting forth reasons why the customer believes the violation/offense should not be imposed, along with any documentation that may substantiate the customer's position.

The customer's written request for a hearing shall include payment of the surcharge. Said payment shall be held on deposit with the DWP. If, following the hearing, it is determined the surcharge will not be imposed, the DWP will refund said deposit.

Upon receipt of a request for a hearing, the General Manager shall contact the customer regarding proposed dates for the hearing. The hearing shall be conducted at the DWP offices. The date of the hearing shall be set at a time that is mutually convenient to both parties, but in any event, shall be held on or before fifteen (15) days from the date of request.

The hearing shall be informal and shall not require adherence to any particular procedure. The General Manager shall render a written decision on or before five (5) days following the date of the hearing.

If the customer is not satisfied with the written decision of the General Manager and is alleging that DWP's General Manager or his staff has violated DWP process, the

customer may appeal the decision to the Board. For all other appeals, the appeals process will be considered completed upon the rendering of the written decision by the General Manager.

The customer shall have the right to appeal alleged DWP process violations by the General Manager or his staff to the Board if the Board receives a written request for such an appeal hearing on or before fifteen (15) days after the date of the General Manager's decision.

Prior to establishing a hearing date, a review committee composed of one or more Board members shall review the customers written request for appeal and determine whether the appeal has merit. A hearing with the Board will only be scheduled when the result of this determination is affirmative.

The hearing before the Board shall be held at a regular Board meeting within 30 days of the DWP receiving the written request for a hearing. The decision of the Board shall be final.

**Section WCR 12. Deposit of Penalty Monies.**

All monies collected by the DWP, pursuant to any of the surcharge provisions of this article, shall be deposited in the Water Revenue Fund as reimbursement for the DWP's costs and expenses of administering and enforcing this article and its general Water Conservation Program.

**Section WCR 13. Severability.**

If any provision of this resolution is found to be illegal, unconstitutional or unenforceable for any reason whatsoever, that provision shall be severed from the remaining provisions of this resolution, which shall remain in full force and effect.

## **ARTICLE NER: NON-WATER SHORTAGE EMERGENCIES**

### **Section NER 1. EMERGENCY RESOLUTION.**

Non-water shortage emergencies (such as wildfires, earthquakes, emergencies other than drought) can be declared and emergency regulations can be enacted by the Board or the General Manager as specified in Section WCR 7 B.

### **Section NER 2. Purpose.**

The purpose of this article is to provide guidelines and procedures for responding to emergencies, other than those related to drought, that have the potential to disrupt the DWP's ability to deliver water to its customers.

### **Section NER 3. Application.**

This article applies to all emergencies that have a potential to cause a disruption in water service to all or part of the DWP service area, with the exception of water shortage emergencies related to drought. Water shortages related to drought will be specifically addressed in section WSER 1.

### **Section NER 4. Policy.**

A. All declared emergencies will be dealt with in three phases.

1. The Assessment Phase
2. The Emergency Phase
3. The Recovery Phase

All decisions associated with this resolution will be determined by the Board, when possible, the General Manager, or his authorized representative.

B. The Assessment Phase is defined as beginning upon the declaration of an emergency at the inception of the event (e.g. an earthquake) or when an event is imminent (e.g. wildfire). Upon the declaration of an emergency, the following procedures shall be followed.

1. DWP staff shall assess the emergency and its potential effects on the DWP's ability to provide water for human consumption, sanitation, and fire protection. This assessment should be completed within 48 hours or less. Under exceptional circumstances or changing conditions, the assessment may require additional time to complete. Nonetheless, assessment of the situation shall be completed as quickly and efficiently as possible under the prevailing conditions.
2. Use of water outdoors for other than emergency purposes shall be prohibited.

3. Use of water indoors for purposes other than human consumption, sanitation, and fire protection shall be prohibited.

4. All water use shall be minimized.

C. Upon completion of the Assessment Phase, the Emergency Phase shall begin and continue as long as emergency conditions persist. For the duration of the Emergency Phase, the following procedures shall be followed.

1. Use of water outdoors for other than emergency purposes shall be prohibited.

2. Use of water indoors for purposes other than human consumption, sanitation, and fire protection shall be prohibited.

3. All water use shall be minimized.

D. When emergency conditions end, the Board, when possible, or General Manager shall declare an end to the Emergency Phase, which will signal the beginning of the Recovery Phase. The Recovery Phase shall last until normal conditions return to the DWP service. For the duration of the Recovery Phase, the following procedures shall be followed.

1. Use of water outdoors for other than emergency purposes shall be prohibited, unless the General Manager determines that restricted outdoor water use is reasonable given the current state of DWP's water system. When restricted outdoor use is permissible, the public will be provided with a specific list of approved outdoor water uses.

2. All water use shall be minimized.

When recovery is complete, water use guidelines shall return to the regulations that were in effect immediately prior to the declaration of the emergency, unless otherwise specified.

For ease of reference, a summary of the actions associated with the three phases described in this article is set forth in the following table:

**Table NER 1. Summary of the guidelines associated with the Emergency Ordinance.**

<b>Assessment Phase</b>	<b>Emergency Phase</b>	<b>Recovery Phase</b>
The first 48 hours after the discovery of the emergency. DWP staff evaluates the current problem and its effect on the water system.	The duration of emergency conditions.	The length of time needed to return to normal conditions.
No outside water use other than fire protection.	No outside water use other than fire protection.	No outside water use other than fire protection. Unless specific direction is provided to the community.
Indoor water use for human consumption, sanitation, and fire protection only. Encourage minimal water use.	Indoor water use for human consumption, sanitation, and fire protection only. Encourage minimal water use.	Indoor water use for human consumption, sanitation, and fire protection only unless specific direction is provided to the community

**Section NER 5. Failure to Comply.**

For failure to comply with the provisions of this article, the provisions of Section WCR 9 shall apply.

## **ARTICLE WSER: WATER SHORTAGE EMERGENCIES**

### **Section WSER 1. WATER SHORTAGE EMERGENCY DECLARATION.**

Water shortage emergencies, related to drought, can be declared and the emergency regulations set forth herein may be implemented after a public hearing as specified in California Water Code Section 351.

### **Section WSER 2. Purpose.**

The purpose of this article is to set forth regulations, guidelines and procedures for responding to emergencies, related to drought, that have the potential to disrupt the DWP's ability to deliver water to its customers.

### **Section WSER 3. Application.**

This article applies to water shortage emergencies that have a potential to cause a disruption in water service to all or part of the DWP's service area. When below average precipitation results in declining water levels in the DWP production wells to such a point that continued delivery of water to the DWP customers is projected to be threatened, immediately or within the foreseeable future, a Water Shortage Emergency may be declared.

### **Section WSER 4. Policy**

The Board, upon declaring a water shortage emergency, and after reviewing Section WSER 5 and recommendations from the TRT, shall determine the Conservation Stage that is appropriate at any given time. Evaluation of the appropriate Conservation Stage will include, but not be limited to, the following considerations.

1. Current ground water levels.
2. Recent trends in the ground water levels.
3. The previous winter's precipitation.
4. The previous year's water demand.
5. Current and anticipated demand for water by DWP customers.
6. Current and anticipated production capacity of DWP water sources.
7. Damage to the DWP's water system.
8. Anticipated ability to optimize use of above-ground water storage.
9. Predicted weather patterns.

### **Section WSER 5. Conservation Stages.**

There shall be four water conservation stages, depending upon the severity of the emergency as determined by the Board. The regulations applicable to each such stage shall be as set forth below.

**Section WSER 5.A. Water Conservation Regulations Associated with Conservation Stage I.**

- A. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 5% below their average monthly consumption during Conservation Stage I.
- B. Outdoor water-use shall be reduced at least 15% below their average monthly consumption during Conservation Stage I.
- C. Landscape irrigation will be permitted only on odd or even days of the month, depending on whether the last number of the customer's street address is odd or even.
- D. Landscaping permits will be required for all new or retrofitted turf installations.
- E. The square footage of turf shall be limited to 1,000 square feet for new or retrofitted landscapes.
- F. DWP will promote indoor water-use conservation.
- G. All water used for construction will be metered.
- H. All new landscapes and modifications to existing landscapes greater than 1,000 square feet, shall be required to obtain a landscaping permit prior to beginning work.
- I. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months, shall be exempt from the water use reductions described in items A and B of Section WSER 5.A, provided their water use remains at this level or lower for the duration of the water shortage emergency.

**Section WSER 5.B. Water Conservation Regulations Associated with Conservation Stage II.**

- A. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 10% below their average monthly consumption during Conservation Stage II.
- B. Outdoor water-use shall be reduced at least 30% below their average monthly consumption during Conservation Stage II.
- C. Indoor water-use shall be reduced at least 5% below their average monthly consumption during Conservation Stage II.
- D. Outdoor irrigation will be permitted only on days authorized by the DWP.
- E. All new landscapes and modifications to existing landscapes greater than 1,000 square feet, shall be required to obtain a landscaping permit prior to beginning



work.

- F. No new turf will be permitted at any location, new or existing.
- G. No DWP water may be used for soil compaction or dust control.
- H. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months, shall be exempt from the stipulations in items A, B and C in section WSER 5.B, provided their water use remains at this level or lower for the duration of the water shortage emergency.

**Section WSER 5.C. Water Conservation Regulations Associated with Conservation Stage III.**

- A. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 25% below their average monthly consumption during Conservation Stage III.
- B. Outdoor water-use shall be reduced at least 60% below their average monthly consumption during Conservation Stage III.
- C. Indoor water-use shall be reduced at least 10% below their average monthly consumption during Conservation Stage III.
- D. Landscape irrigation will be permitted only two days per week, on days designated by the DWP.
- E. Irrigation of turf shall be prohibited.
- F. No DWP water shall be used for ponds, streams, or fountains with a capacity greater than 50 gallons.
- G. No new turf will be permitted at any location, new or existing.
- H. All new landscapes and modifications to existing landscapes, greater than 1,000 square feet shall be required to obtain a landscaping permit prior to beginning work. All new plant material must be low water use (Xeriscape).
- I. No DWP water may be used for soil compaction or dust control
- J. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months shall be exempt from the stipulations in items A, B and C in section WSER 5.C, provided their water use remains at this level or lower for the duration of the water shortage emergency.

**Section WSER 5.D. Water Conservation Regulations associated with Conservation Stage IV.**

- A. All DWP residential and commercial customers shall reduce their water consumption by a minimum of 45% below their average monthly consumption during Conservation Stage IV.
- B. Outdoor water-use shall be reduced at least 90% below their average monthly consumption during Conservation Stage IV.
- C. Indoor water-use shall be reduced at least 20% below their average monthly consumption during Conservation Stage IV.
- D. No outdoor water use shall be permitted, except commercial car washes that recycle water.
- E. No landscape irrigation shall be permitted.
- F. No DWP water shall be used for ponds, streams, fountains and new or unfilled swimming pools.
- G. No new turf will be permitted.
- H. No DWP water may be used for soil compaction or dust control.
- I. All new landscapes and modifications to existing landscapes greater than 1000 square feet shall be required to obtain a landscaping permit prior to beginning work. Only landscape items requiring no water to establish or maintain may be installed.
- J. DWP customers using 8 ccfs/month or less, for all billings during the previous 12 months shall be exempt from the stipulations in items A, B and C in section WSER 5.D, provided their water use remains at this level or lower for the duration of the water shortage emergency.

For ease of reference, a summary of the actions associated with the four water conservation stages described in this article is set forth in the following table:

Stage I	Stage II	Stage III	Stage IV
Residential & commercial customers reduce use by 5%.	Residential & commercial customers reduce use by 10%.	Residential & commercial customers reduce use by 25%.	Residential & commercial customers reduce use by 45%.
Even/odd watering schedule, 15% reduction in outdoor water use.	Designated days watering schedule, 30% reduction in outdoor water use.	2 day per week watering schedule, target 60% reduction in outdoor water use.	No outside water use except car washes that recycle, 90% reduction in outdoor water use.
Promote indoor water use conservation.	5% reduction in indoor water use.	10% reduction in indoor water use.	20% reduction in indoor water use.
Landscape permits required.	Landscape permits required.	Landscape permits required.	Landscape permits required.
Permits for new turf with size limit.	No new turf.	No new turf.	No new turf.
		No turf irrigation.	No outside water use.
		No DWP water for ponds, streams, or fountains over 50 gallons.	No DWP water for ponds, streams, fountains, or new or unfilled pools.
Water for construction metered.	No DWP water for soil compaction or dust control.	No DWP water for soil compaction or dust control.	No DWP water for soil compaction or dust control.

The water-use restrictions, listed in Conservation Stages I-IV, provide general water use regulations to be implemented during water shortage emergencies. Additional restrictions may be recommended by the TRT, as they are determined necessary. Additional restrictions may be issued by the Board, whenever it convenes, to review new emergency conditions and/or reevaluate appropriate Conservation Stages. It is the responsibility of the General Manager to keep the Board informed as the drought emergency develops.

#### **Section WSER 6. Failure to Comply.**

For failure to comply with the provisions of this article, the provisions of Section WCR 9 shall apply.

PASSED, APPROVED, and ADOPTED this 27th day of April, 2004.

AYES: Herrick, Conley, Speyers, Willey

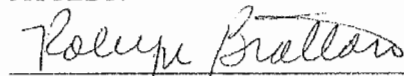
NOES: None

ABSENT: Etter

4-27-04  
Date

  
Rick Herrick, Chairman  
DWP Board of Commissioners

ATTEST:


  
Robyn Bratton  
Secretary to the Board of Commissioners

## CERTIFICATION

STATE OF CALIFORNIA           )  
COUNTY OF SAN BERNARDINO )  
CITY OF BIG BEAR LAKE       )

I, Robyn Bratton, Secretary to the Board of Commissioners of the Department of Water & Power of the City of Big Bear Lake, California, do hereby certify that the whole number of members of said Board is five, that the foregoing resolution, being Resolution No. DWP 2004-03, was duly passed and adopted by said Board and attested to by the Secretary of said Board, all at a Regular meeting of the said Board, held on the 27<sup>th</sup> day of April, 2004, that the same was so passed and adopted by the following vote:

AYES:       Herrick, Conley, Speyers, Willey  
NOES:       None  
ABSENT:     Etter

  
Robyn Bratton  
Secretary to the Board

(SEAL)

# ARTICLE 1

## REGULATIONS FOR EFFICIENT WATER USE ON LANDSCAPES

### Section 1. Purpose.

The purpose of this Resolution is to set forth and require all new, retrofitted, or modified landscaping to adhere to landscaping practices guided by the latest low water use technology that emphasizes water-use efficiency to maximize the benefit of existing water supplies for the citizens of, visitors to, and the economic well-being of the Big Bear Valley. These measures will significantly reduce wasteful and inefficient consumption of water, and thus make these water resources available for human consumption, sanitation, and fire protection.

### Section 2.A. Application.

These Regulations shall apply to all DWP customers, including customers who may also take ground water from private wells not owned or operated by the DWP.

### Section 2.B. Exception.

Some or all of the guidelines and prohibitions contained in these Regulations may not apply to specific, publicly owned properties such as schools and parks, which will be evaluated on a case-by-case basis.

### Section 3. Goals and Objectives.

Due to the increasing demand for water by DWP customers for landscaping, and the finite nature of the Big Bear Valley's water resources, the general welfare of the community is best served by using the available water supply efficiently for maximum beneficial uses. Wasteful, inefficient, and unreasonable uses of water must be prevented.

Therefore, the DWP hereby declares and establishes the following goals and objectives pertaining to the use of water provided by DWP for landscaping.

#### A. Goals

1. Efficient use and distribution of water used for landscaping and irrigation.
2. Conservation of limited water resources.
3. Appropriate planning to eliminate all wasteful and inefficient uses of water from all landscape plans during the planning stage.
4. Provide reasonable and appropriate size and water-use limitations for all landscape features.

## **B. Objectives**

1. To conserve the available water supply.
2. To achieve an overall, per capita reduction in water use.
3. To eliminate inefficient irrigation.
4. To reduce the volume of water waste.
5. To ensure an adequate supply of water to meet the reasonable needs of all users of DWP water.
6. To increase the use and installation of water-conserving plants, landscapes, mountainscapes, and Xeriscapes.
7. To require all new developments and encourage existing developments to install low water-use landscape elements and erosion control devices that encourage groundwater recharge.

## **Section 4. DEFINITIONS.**

The following words and phrases, whenever used in this article, shall be construed as defined in this section, unless otherwise specified within individual sections of this article.

Adequate and sufficient water supply. A water supply that is sufficient to meet all reasonable needs of the community for the foreseeable future.

Agricultural well. Any water well used to supply water specifically for irrigation or other agricultural purposes.

All DWP customers (City and County). All persons, residences, businesses, and entities who receive and/or use water provided by DWP.

Aquifer. A permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients.

Board. DWP Board of Commissioners.

CCF. CCF = 100 cubic feet = 748 gallons.

Drought. A series of years where precipitation is below average.

Dry Well. A pit dug into the ground near a source of excess storm runoff designed to promote percolation. Typically 3-5 feet deep and filled with gravel.

Emitter. Any irrigation nozzle that is used to distribute water to landscape vegetation.

Environmental sensing device. Any device that uses or recognizes weather or soil moisture to modify irrigation schedules. Typical examples are Evapotranspiration irrigation controllers, soil moisture sensors, and rainfall shut-off devices.

Erosion. The process of moving soil by any agent of weather, typically rainfall runoff.

Erosion control. Anything that inhibits erosion.

Existing developments. Developments for which certificates of occupancy have been granted.

Finite. Limited in quantity.

Fire protection. Water needed to protect humans and their property from an active fire.

Greatest public benefit. Anything that is most beneficial, in the long-run, to the majority of the community.

Ground water. Any water that comes from springs or wells.

Hardscape. A landscape feature that contains no vegetation. Examples include walkways, decks, graveled areas, areas covered with mulches, etc.

His. A collective term independent of gender and may refer to male or female.

Human consumption. Water directly consumed by humans and their pets or livestock.

Individual domestic well. Any water well used to supply water for the domestic needs of an individual residence or systems of four or fewer service connections.

Inefficient. Using water in a quantity in excess of the amount required, as determined by the DWP, to accomplish a given task.

Inefficient irrigation. The process of providing more water to landscape plants or elements than is required for healthy, normal growth and appearance.

Irrigation. The process of providing supplemental water, provided by the DWP, to landscape plants and elements.

Landscape. All portions of a property that are not covered by the foundations of buildings or other structures.

Landscape element. Any and all unique features of a landscape.

Landscaping. The process of adding or subtracting vegetation or non-vegetative materials or their support structures (irrigation systems, walkways, retaining walls, etc.) to a landscape.

Limited. A substance without endless supply.



Low flow. Any water fixture that meets or exceeds current low flow standards for that item.

Maximize the benefit. To obtain the greatest feasible benefit.

Mountainscape. Any low water-use landscape that is compatible with the climate of the Big Bear Valley.

Native plant. A plant indigenous to the San Bernardino Mountains; specifically, indigenous plants that require little or no irrigation to survive.

New developments. Developments that are under construction or will be constructed in the near future, and for which certificates of occupancy have not been granted.

Per capita. On average for each member of the community whose numbers may change over time.

Percolation. Movement of water, by the forces of gravity, through soils and bedrock to a point of greater depth than its previous location.

Perennial yield. The maximum quantity of water available on an annual basis for the foreseeable future. This quantity depends on the amount of water economically, legally, and politically available to the organization(s) managing the ground water basin.

Periodic drought. Droughts that occur at regular or irregular intervals.

Practical and reasonable. An activity that achieves a desired goal and can be performed by an average person.

Precipitation. Water, in all its forms, that falls from clouds onto the surface of the earth.

Rain shut-off sensor. Any mechanism that detects precipitation and transmits the information to an irrigation controller.

Recharge. The process of adding water to an aquifer.

Recycle. To use for the same purpose multiple times.

Retrofit. Any change to an existing element.

Reuse. To use more than once; typically, multiple times.

Sanitation. Cleanliness or the disposal of unhealthful waste.

Technical Review Team (TRT). A team of, at minimum, five individuals that will be comprised of Board Members, DWP management staff, and one hydrogeologist or engineering consultant. Additional individuals may be added to the TRT when any circumstance arises requiring specialized or additional expertise.

Turf. Synonymous with lawn, grass, etc.

Wasteful. Using water in a quantity in excess of the amount needed to accomplish a given task.

Water conservation plan. A plan developed for any property that provides recommendations for conserving water based on how the home or business occupying the property used water in the past.

Water conserving landscapes. Landscapes that require little water to remain in good condition.

Water conserving plants. Plants that require little water to remain in good condition.

Water conservation. Practices or activities which result in the use of water efficiently and in quantities considered less than average.

Water features. Any landscape feature that utilizes standing or moving water as a main component. Standard examples are ponds, streams, and fountains.

Water loss. The unaccounted-for disappearance of water.

Water resources. The retrievable and usable supply of water.

Water shortage emergency. An emergency that is caused by extended periods of below average precipitation (i.e. drought).

Water usage. The act of using water provided by the DWP water system.

Water-use efficiency. The use of water in a way that minimizes waste (i.e. use beyond which is needed to accomplish a task).

Winterize. Turning off the water service and draining the on-site pipes or plumbing to prevent damage to the system during the winter months due to freezing.

Xeriscape. A landscape that requires relatively little water to install and maintain. Qualifying landscapes include those that range from highly vegetated to completely lacking in vegetation.

## **Section 5. Water-Use Policies and Requirements.**

- A. Customers shall be encouraged to use native and water-conserving plants for landscaping.
- B. Customers shall be required to minimize the use of turf at all new and retrofitted commercial and residential landscapes.

- C. Water conservation, emphasizing water use efficiency, will be required as set forth herein.
- D. The DWP shall require and promote development of water conservation plans for all customers whose water use exceeds reasonable guidelines developed by the DWP.
- E. The DWP shall require repair of all leaks, once they are detected.
- F. All outdoor irrigation systems shall be shut off and winterized between November 1<sup>st</sup> and April 1<sup>st</sup> annually.
- G. The DWP will establish reasonable water use and irrigation standards for all residential and commercial customers in its service area.

**Section 5.A. Definition of "essential" water use.**

The term **essential** water-use is defined as water necessary for human consumption, sanitation, and fire protection. All other uses of water, not specifically required to meet these needs, shall be considered **nonessential**.

**Section 5.B.** The following uses of water are, hereafter, considered **nonessential** to human consumption, sanitation, and fire protection; and, if allowed, would constitute wastage of water and are hereby prohibited, pursuant to Water Code Section 350 et. seq., Water Code Section 71640 et. seq., and the common law:

**DEFINITIONS OF NONESSENTIAL WATER USES**

<b>Washing of sidewalks, driveways, porches, patios, buildings, structures, etc.</b>
<b>Water to clean, fill, or operate decorative water features.</b>
<b>Leaks.</b>
<b>Irrigation between 9 a.m. and 6 p.m.</b>
<b>Washing vehicles without a bucket and shut-off valve.</b>
<b>Fire hydrant water for other than fire protection.</b>
<b>Flooding of gutters, driveways, and streets.</b>
<b>This list includes the most common nonessential water uses, but is not all inclusive.</b>

1. There shall be no washing using water from a hose of sidewalks, walkways, driveways, parking areas, patios, porches, or verandas, buildings, and structures, except when needed to protect public health and safety.
2. No water shall be used to clean, fill, operate, or maintain levels in decorative fountains unless such water is part of a recycling system.
3. No person shall permit water to leak from any facility on his premises, and all leaks shall be repaired in a timely manner.

4. Commencing April 1<sup>st</sup>, and terminating November 1<sup>st</sup>, annually, there shall be no irrigation between the hours of 9 a.m. and 6 p.m. Irrigation shall not exceed the needs of the plants being watered or be applied at a rate and quantity that causes runoff.
5. Noncommercial washing of privately owned vehicles, trailers, buses, or boats must be conducted through the use of a bucket and a hose equipped with a shut-off nozzle.
6. There shall be no use of water from a fire hydrant, except for fire protection purposes.
7. There shall be no flooding or run-off in gutters, driveways, or streets.
8. The preceding list, contained in Section 5.B. will not be considered all-inclusive, but simply a guide for the most common forms of nonessential water use.

#### **Section 6. Guidelines for Turf installations**

- A. Turf installations may not exceed 500 square feet in size.
- B. All new and retrofitted landscapes with turf must be irrigated, using a sprinkler system with an automatic irrigation controller, that has the capability to accommodate all time and date irrigation restrictions employed by the DWP.

#### **Section 7. Guidelines for Installing Water Features**

- A. The size of all water features (ponds, fountains, streams, etc.) combined will be limited to 500 square feet of total surface area.
- B. Additionally, moving water (fountains, streams, etc.) must be operated by using a recirculating pump.

#### **Section 8. Determination of When Landscape Plans Must Be Submitted**

- A. **New Installations.** Landscape plans must be submitted for review and approval by a DWP representative whenever the proposed landscape exceeds 1,000 square feet or when any turf is proposed to be installed.
- B. **Retrofitting or Altering an Existing Landscape.** Landscape plans must be submitted for review and approval by a DWP representative whenever the combination of the existing landscape and the proposed additional or retrofitted landscape exceeds 1,000 square feet.
- C. **Plan Review and Approval.** All landscape plans must be submitted to the DWP for review and approval at least thirty (30) days prior to the estimated start of installation.

### **Section 9. Guidelines for New Landscapes**

- A. Turf installations will not exceed 500 square feet in size.
- B. Landscape plants must be grouped by similar irrigation requirements and irrigation systems must be set up to irrigate individual water-use zones in accordance with their individual needs.
- C. Turf and water features combined, may not occupy more than 25 percent of the landscaped area in all proposed landscapes.
- D. All slope and soil conditions, that may cause excessive runoff, must be identified and clearly resolved during the planning and installation process.
- E. Landscape elements must be appropriately maintained to maximize water-use efficiency.
  - 1) All sprinkler, emitter, pipe and pond leaks must be repaired in a timely fashion, and all irrigation systems must be tested and inspected before regular use each spring.
  - 2) All irrigation systems must be shut off and winterized between November 1<sup>st</sup> and April 1<sup>st</sup> annually.

### **Section 10. Guidelines for Retrofitting Landscapes**

- A. On landscapes that do not contain turf, turf may be installed in accordance with the turf installation guidelines, limited to 500 square feet.
- B. Turf may not be expanded in existing landscapes containing turf, unless the current area of turf is less than 500 square feet. Total area of turf may not exceed 500 square feet.
- C. On landscapes that already contain turf, turf may be rearranged as long as the net area of turf is reduced 25 percent.
- D. Existing irrigation systems may be used as long as they can be employed to maximize irrigation efficiency on the retrofitted landscape. If this is not possible, a new irrigation system must be installed.
- E. Landscape plants must be grouped by similar irrigation requirements and irrigation systems must be set up to irrigate individual water-use zones in accordance with their individual needs.
- F. All slope and soil problems that may cause excessive runoff must be identified and clearly resolved for during the planning process.

G. Landscape elements must be appropriately maintained to maximize water-use efficiency.

- 1) All sprinkler, emitter, pipe and pond leaks must be repaired in a timely fashion and all irrigation systems must be tested and inspected before regular use each spring.
- 2) All irrigation systems must be shut off and winterized between November 1<sup>st</sup> and April 1<sup>st</sup> annually.

**Section 11. Guidelines for Planning and Installation of Irrigation Systems.**

- A. Automatic irrigation control systems are required on all landscapes greater than 1,000 square feet in size.
- B. Sprinklers will only be allowed on turf and other groundcovers. All other landscape plantings must be irrigated with efficient, low water-use devices (e.g. drip system or bubblers).
- C. Sprinklers may not be used on planter strips less than 10 feet wide.
- D. All irrigation controllers must be equipped with rain shut-off sensors.

**Section 12. Guidelines for Promoting Groundwater Recharge and Controlling Erosion**

- A. All new and retrofitted landscapes must identify potential erosion problems and ground water recharge opportunities. Often, these issues are one and the same (e.g. roof runoff through downspouts).
- B. Capturing runoff and promoting infiltration.
  - 1) All building roof runoff must be captured in infiltration systems. Roof drip line runoff must be captured in trenches that promote infiltration. Downspout runoff must be directed to a dry well system.
  - 2) The capacity of infiltration trenches and dry wells must be designed to accommodate normal storm runoff.
- C. Preventing erosion.
  - 1) All slopes and areas of bare soil must be evaluated for their erosion potential.
  - 2) All areas that are susceptible to erosion must be addressed with an erosion prevention plan (e.g. groundcovers, non-erodible mulches, retaining walls, terraces, etc.).
  - 3) Areas that contain running water from adjoining properties during rain showers or snow melt must be prepared to minimize additional erosion from the immediate property (e.g. dry stream beds, erosion resistant vegetation, etc.).

### **Section 13. Instructions for Submitting Landscape Plans**

**A. If the new or retrofitted landscape exceeds 3,000 square feet, please submit the following:**

- 1) Appropriate addresses and contact information for the property owner and landscape contractor.
- 2) The proposed landscape design.
- 3) The existing landscape design, if the landscape is being retrofitted.
- 4) Identification of low, medium, and high water-use vegetation zones.
- 5) Plant lists associated with each water-use vegetation zone.
- 6) The proposed irrigation system design.
- 7) The existing irrigation system design, if the landscape is being retrofitted.
- 8) Identification of areas with slope or soil problems that need special irrigation features to effectively irrigate these areas.
- 9) A detailed description of solutions to irrigation problems identified in Item #8 (immediately above).
- 10) Identification and description of ground water recharge and erosion control features.
- 11) Proposed irrigation schedules for all landscape features.
- 12) A list of environmental sensing devices associated with irrigation controllers (Evapotranspiration controllers, soil moisture sensors, rainfall shut-off devices, etc.).
- 13) A detailed description of all water features.
- 14) An estimate of water use per month (in ccfs) for all landscape features, including water loss associated with water features. 1 ccf = 748 gallons.
- 15) A maintenance schedule for all landscape features.
- 16) A north arrow.
- 17) All property lines.
- 18) Submittal and revision dates.
- 19) A written narrative highlighting water-conserving features of the proposed landscape and its adherence to Xeriscape principles.

**B. If the new or retrofitted landscape is less than 3,000 square feet and greater than 1,000 square feet, please submit the following:**

- 1) Appropriate addresses and contact information for the property owner and landscape contractor.
- 2) The proposed landscape design.
- 3) If a landscape is being retrofitted, provide a written summary of the proposed changes and a list of the water-conserving features of the new landscape.
- 4) An estimate of water use per month (in ccfs) for all landscape features, including water loss associated with water features. 1 ccf = 748 gallons.

**Section 14. Failure to Comply.**

The penalties for failure to comply with any of the provisions of this article shall be as follows:

- A. **First violation.** The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, a list of penalties associated with continued violation, and request voluntary compliance.
- B. **Second violation.** The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, and add a surcharge to the customer's water bill which is twice the customer's current charge for water usage.
- C. **Third violation.** The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, add a surcharge to the customer's water bill which is triple the customer's current charge for water usage, and notify the Board.
- D. **Fourth violation.** The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, install a flow restrictor in the customer's water service, add a surcharge to the customer's bill which is quadruple the customer's current charge for water usage and all associated expenses to the customer's water bill, and notify the Board.
- E. **Fifth violation.** The DWP will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, and, upon approval of the Board, discontinue water service to the customer until the customer delivers a notarized written agreement to abide by all water use regulations established by DWP and such other requirements as the Board may determine to be appropriate under the circumstances.



### **Section 15. Removal of the Flow Restrictor.**

The water restrictor will be removed, or water service will be restored, whichever the case may be, upon a hearing as provided below where the customer demonstrates to the satisfaction of the General Manager that the cause of the violation has been corrected and all fees and surcharges have been paid.

### **Section 16. Appeal Process.**

A customer shall have the right to a hearing before the General Manager if the DWP receives a written request for such a hearing on or before twenty-one (21) days after the date the notice is mailed to the customer.

The written request for a hearing shall include a statement setting forth reasons why the customer believes the violation/offense should not be imposed, along with any documentation that may substantiate the customer's position.

The customer's written request for a hearing shall include payment of the surcharge. Said payment shall be held on deposit with the DWP. If, following the hearing, it is determined the surcharge will not be imposed, the DWP will refund said deposit.

Upon receipt of a request for a hearing, the General Manager shall contact the customer regarding proposed dates for the hearing. The hearing shall be conducted at the DWP offices. The date of the hearing shall be set at a time that is mutually convenient to both parties, but in any event, shall be held on or before fifteen (15) days from the date of request.

The hearing shall be informal and shall not require adherence to any particular procedure. The General Manager shall render a written decision on or before five (5) days following the date of the hearing.

If the customer is not satisfied with the written decision of the General Manager, and is alleging that DWP's General Manager or his staff has violated DWP process, the customer may appeal the decision to the Board. For all other appeals, the appeals process will be considered completed upon the rendering of the written decision by the General Manager.

**The customer shall have the right to appeal alleged DWP process violations by the General Manager or his staff to the Board**, if the Board receives a written request for such an appeal hearing on or before fifteen (15) days after the date of the General Manager's decision.

Prior to establishing a hearing date, a review committee composed of one or more Board members shall review the customers written request for appeal and determine whether the appeal has merit. A hearing with the Board will only be scheduled when the result of this determination is affirmative.

The hearing before the Board shall be held at a regular Board meeting within thirty (30) days of the DWP receiving the written request for a hearing. The decision of the Board shall be final.

**Section 17. Deposit of Penalty Monies.**

All monies collected by the DWP, pursuant to any of the surcharge provisions of this article, shall be deposited in the Water Revenue Fund as reimbursement for the DWP's costs and expenses of administering and enforcing this article and its general Water Conservation Program.

**Section 18. Severability.**

If any provision of these Regulations is found to be illegal, unconstitutional, or unenforceable for any reason whatsoever, that provision shall be severed from the remaining provisions, which shall remain in full force and effect.

## CII WATER RATES

May 22, 2003

CATEGORY	Water Rate Code	1ST TIER	2ND TIER	3RD TIER	4TH TIER	5TH TIER
		\$2.06	\$2.86	\$4.27	\$7.04	\$9.77
RESIDENTIAL	001	24	16	20	40	over 100 ccf's
LIFA (1st Block) - 15% less	800	24	16	20	40	over 100 ccf's
LIFA (1st & 2nd Block) - 15% less	801	24	16	20	40	over 100 ccf's
RIM FOREST	700	(determined at the time of billing)				
LIFA (Rim)	870	15% less				
REGULAR BUSINESS ACCTS.		<u>1ST TIER</u>	<u>2ND TIER</u>	<u>3RD TIER</u>	<u>4TH TIER</u>	<u>5TH TIER</u>
		\$2.06	\$2.86	\$4.27	\$7.04	\$9.77
	200	14	20	20	40	over 94 ccf's
	201	24	20	20	40	over 104 ccf's
	205	48	20	20	40	over 128 ccf's
	210	71	20	20	40	over 151 ccf's
	215	95	20	20	40	over 175 ccf's
	220	119	20	20	40	over 199 ccf's
	225	143	20	20	40	over 223 ccf's
	227	166	20	20	40	over 246 ccf's
	230	190	20	20	40	over 270 ccf's
	235	238	20	20	40	over 318 ccf's
	240	285	20	20	40	over 365 ccf's
	243	333	20	20	40	over 413 ccf's
	245	380	20	20	40	over 460 ccf's
	247	428	20	20	40	over 508 ccf's
	250	475	20	20	40	over 555 ccf's
	255	570	20	20	40	over 650 ccf's
	260	665	20	20	40	over 745 ccf's
		<u>1ST TIER</u>				
		\$2.06				
PARKS/SCHOOLS/BIG BEAR SHORES	999	ALL				

# **Appendix E**

## **Notice of Public Hearing**

**To be added prior to Final Copy**

# **Appendix F**

## **Public Comments**

**To be added prior to Final Copy**

# **Appendix G**

## **Department of Water and Power Adoption Resolution**

**To be added prior to Final Copy**